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EXTRAVERSION: IN SEARCH OF A PERSONALITY DIMENSION

by



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A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH  
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE  
OF DOCTOR OF PHILOSOPHY

DEPARTMENT OF PSYCHOLOGY

EDMONTON, ALBERTA

FALL, 1971





## UNIVERSITY OF ALBERTA

## FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled "Extraversion: In Search of a Personality Dimension", submitted by James A. Browne in partial fulfilment of the requirements for the degree of Doctor of Philosophy.





## ABSTRACT

The concept and use of the term 'EXTRAVERSION' is traced from its earliest historical antecedents in the seventeenth century up to the present time, in order to show the extent to which early attempts to discuss and define the term had floundered in confusion and disagreement. It was, therefore, not until the metric era (which included the Guilfords' [1934] highly original item-factor-analytic work) that progress began in the direction of a beginning for a multivariate trait approach. The development of several scales and inventories to measure 'extraversion' is described in the metric era. The major question which emerges from this thorough survey is: Do we have a single dimension or many?

Coming to the recent literature on this subject we discuss the large scale item-factor-analyses of Eysenck and Eysenck (1969), Parker and Veldman (1969), Sells, Demaree and Will (1970), and Howarth and Browne (1971) and, in comparative terms, are able to demonstrate that several replicable primary personality factors can be identified, for the first time.

On the basis of this somewhat prolonged, but inclusive and highly necessary literature survey 20 different item-sources from the Freyd List (1924) to the Comrey Personality Scales (1970) were assembled encompassing 1726 putative questionnaire items. Four hundred putative items were selected on the basis of factor hypotheses and their actual item factor structure was then determined by means of item-factor-analysis using the Method of Principal Components followed by ortho-



gonal (Varimax) rotation. Subjects for the study were 488 female and 515 male undergraduate university students from 13 participating universities across Canada.

Four separate analyses were performed on the data: (1) 20 factor Varimax of the combined data (N=1003); (2) 20 factor Varimax of the males (N=515); (3) 20 factor Varimax of the females (N=488); (4) a more definitive 12 factor Varimax on the combined data. The 12 factors finally identified were: 1. Sociability (SY); 2. Adjustment-Emotionality (AE); 3. Social Shyness (SH); 4. Trust vs. Suspicion (TS); 5. Impulsivity (IP); 6. Persistence (PS); 7. Sex and Super-ego (SX/SG); 8. 'Freudian Introversiion' (FI); 9. Dominance (AD); 10. Unidentified; 11. Cooperativeness-Considerateness (CC); 12. Inferiority (IF).

These results represent most satisfactory evidence for factor replicability because nine of the 11 interpretable factors have been previously identified in several studies dating back to the Guilfords' (1934). These are factors: SY, AE, SH, TS, IP, PS, AD, CC, and IF.

The results are discussed in terms of the replicability of primary factors obtained through item-factor-analysis. Implications for the future development of inventories are indicated, with the recommendation that current personality inventories are not - for the reasons discussed - entirely satisfactory.

In regard to 'extraversion' it is now clearly apparent that this cannot be defined by adequately constructed questionnaires and is a





broad concept which belongs elsewhere, unless one is prepared to conceptualize 'clusters' of certain primary factors, for which the present evidence is questionable.





## ACKNOWLEDGEMENTS

I would like to express my gratitude and sincerest thanks to Professor Edgar Howarth for the unstinting supervision and assistance he has given through every phase of this thesis project. Without Professor Howarth's considerable personal work, particularly in the development of the Comprehensive Opinion Survey and 'MAXVAR', this study would not have been possible.

It is an understatement to simply say 'thanks' to Miss Uta Kreger for the assistance she has contributed in terms of secretarial work both for the development of COS and in the preparation of our publications. Uta was not, by trade, a secretary, but rather a student, here from Germany to study the English language, and who has since returned to Germany to work as an interpreter.

A note of gratitude is also expressed to the computer specialists spearheaded by Professor Howarth who made 'MAXVAR' an operational reality. Special thanks are due to the able assistance given by Mr. Peter Braun.

This writer gratefully acknowledges the assistance in the administration of the Comprehensive Opinion Survey, given by the following: Professor G.A. Milton, University of Victoria, Professor R.G.A. Stretch, University of Saskatchewan (Saskatoon); Dr. C. Knapper, University of Saskatchewan (Regina); Professor E.J. Tyler, Brandon University; Dr. Y. Eylon, University of Winnipeg; Dr. S. Ahmed, Laurentian University; Dr. A.G. Worthington, Trent University; Dr. V.H. Schaefer, Waterloo Lutheran University;



Dr. W.E. Walther, Carleton University; Dr. R.H. Shevenell,  
University of Ottawa; Dr. J. Stewart, Sir George Williams University;  
Professor W.K. Caird, Dalhousie University; Dr. O.C. Sharkey,  
University of Prince Edward Island.

Special thanks are due to Betty Florchyk for the final  
preparation of this manuscript; the second which she has completed  
so commendably for this writer.

Special thanks also to my wife Lois for her assistance in  
proofreading the manuscript.





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## STATEMENT OF POSITION

It may, at first glance, appear to the reader that this thesis is much too polemical. Yet, the important issues in contemporary psychology, upon which this thesis bears, do not permit a 'neutral' approach. The reason for this is that the whole matter of Prior Multivariate Operational Definition of concepts in psychology, is, at the present time, thoroughly misunderstood (specifically by clinicians and experimental psychologists). If we are going to attempt to define such terms as 'extraversion' and 'anxiety' it must be (a) in multivariate terms, (b) by means of thoroughly developed instruments. One of these instrument types, is the questionnaire.

It must be emphasized that while research on 'extraversion' has been extended to experimental-laboratory studies, including drug studies and psychophysiological investigations, these aspects are not under consideration in the present thesis, which is concerned specifically with the development of questionnaire measures. This concentration on questionnaire media is of utmost importance because of the current wide use of questionnaires for the selection of experimental subjects. Considering both the popularity of the term 'extraversion', and the uncritical use of certain questionnaires, the development of measures for the primary components (personality questionnaire factors) as a basis for multivariate selection procedures, is a vital concern.



PART I

INTRODUCTION





The points I have endeavoured to impress are chiefly these. First, that character ought to be measured by carefully recorded acts, representative of the usual conduct. An ordinary generalisation is nothing more than a muddle of vague memories of inexact observations. It is an easy vice to generalise. We want lists of facts, every one of which may be separately verified, valued and revalued, and the whole accurately summed. It is the statistics of each man's conduct in small every-day affairs, that will probably be found to give the simplest and most precise measure of his character. The other chief point that I wish to impress is, that a practice of deliberately and methodically testing the character of others and of ourselves is not wholly fanciful, but deserves consideration and experiment.

[Francis Galton, Fortnightly Review, 1884, 36, p. 185]



Note on the separation of Chapters One and Two.

The major consideration for the first two chapters of this thesis is that of the conceptualization of EXTRAVERSION; the literature and the progress towards operationalizing of the concept.

In Chapter One, an attempt has been made to present early usages, including distinctions and similarities between Jung and Freud.

Chapter Two begins with J.P. Guilford and develops the considerations for a multivariate approach eventuating in the recent large scale item-factor-analyses.

Separate reference sections are presented at the end of each chapter, throughout the thesis, for the convenience of the reader and for general convenience in converting some of this material into publishable material in due course.



## CHAPTER ONE

## PRE-METRIC AND EARLY METRIC CONSIDERATIONS OF 'EXTRAVERSION'

PRE-METRIC CONSIDERATIONS.The Greek Scholastics: Theophrastus and Plato

Man, certainly by the time of the ancient Greek civilizations, and very probably long before, was curious about individual differences, e.g. Theophrastus asked:

Why is it that while all Greece lies under the same sky and all the Greeks are educated alike, it has befallen us to have characters variously constituted? (Eysenck and Eysenck, 1969, p. 11).

Similarly, an early speculation concerning the many-faceted nature of man may be further illustrated by means of a quotation from Plato:

This is truly hard (to decide) whether we perform our separate acts by one and the same power, or whether, as they are three, we perform one by one, and another by another; that is learn by one, get angry by another, and by a third covet the pleasures of nutrition and propegation and others akin to these; or whether, when we devote ourselves to them, we act on each with the whole soul; these matters are difficult adequately to determine (Spearman, 1937, Vol. I, p. 107).

Such questions have echoed through time and have lost none of their spirit with passing centuries. However during the passage of the years the attempts to 'answer', 'explain' and approach the issue have undergone great changes, as adumbrated in the following quotation:





...in the case of the orectic sphere of the psyche,... the earliest attempts at scientific theory consisted in reducing the countless actual activities to a very small number of underlying separate principles, named 'faculties', 'powers', or capacities. Subsequently, under other designations, such as those of temperaments and traits, many other attempts have been made at analogous reductions... Such an organization of the facts, if successful, would no doubt constitute a great scientific advance (Spearman, 1937, Vol. I, p. 181).

In order to illustrate these changes we will pass on from the earliest speculations of the Greeks, to the speculations of quite recent vintage...(noting that it is only very recently that we have begun to progress from speculative observation - 'note taking', as it were - to the possibility of genuine scientific measurement - categorization).

### Typologies

The concept of a behavioral typology illustrates a step along the way from speculation to categorization.

The words 'type' and 'psychological' are ambiguous words. We do not start from well defined terms, but only ask: (1) What are the constituents of the concept 'psychological type'? (2) What methods of determining types are used? Problems of this kind have always been of great importance to the student of human nature. Innumerable doctrines of temperament and character have been formulated. Laehr's 'Die Literatur der Psychiatrie, Neurologie und Psychologie von 1459 - 1799' presents about 430 sources on the subject of temperament. After 1800, one has actually to deal with thousands of works, (Heinrich Kluver, 1925, p. 561).



Early authors (psychologists, psychiatrists, and philosophers), in an attempt to describe 'individual differences' in character and temperament, sought to classify and categorize individuals in terms of 'observed similarities', and very often appealed to the concept of 'types', conveniently obtained from French notions of 'biotypologie' (Spearman, 1937, Vol. II). Of the numerous antithetical types posited, the more prominent include: James (1890), explosive vs. obstructive will; Jordan (1896), active-less impassioned vs. reflective-more impassioned; Stern (1900) objective vs. subjective; Gross (1902), broad-shallow vs. deep-narrow; Baldwin (1902), sensory vs. motor; James (1907), tender vs. tough-minded; Heymans and Wiersma (1908), manic vs. melancholic; Ostwald (1910), classicists vs. romanticists, Trotter (1916), stable vs. unstable; Watson (1919), impulsive vs. deliberate reactors; Jung (1923), extravert vs. introvert; Kretschmer (1926), cyclothymic vs. schizothymic; Pavlov (1927), inhibitory vs. excitatory; Hunt (1929), erethytic vs. kolytic; Pavlov (1941), strong vs. weak nervous system; Rorschach (1942), extratensive vs. introvertive, and Sheldon (1942), viscerotonic vs. cerebrotonic.

On first inspection many of these 'independently' suggested schemes will be seen to be extremely similar. Closer examination, however, reveals that they are all referring to some kind of directional mechanism; a mechanism which alters the 'psychic forces' in forward and backward directions resulting in the observed manifest behaviors. Further, when it is considered that various of these authors borrowed a good deal from previous work, the similarities become even greater. Thus Jung, in presenting his two attitudinal



mechanisms 'extraversion' and 'introversion', credited Gross and Jordan who had preceded him. It is very interesting to note that few of the types have been so pervasive, and received so much attention, from researchers and clinicians alike, as 'EXTRAVERSION' and 'INTROVERSION', and it is to a consideration of these types that we now turn.

#### Extraversion-Introversion: A Brief Historical Sampling.

The word 'extraversion' is constructed from extra - meaning 'outwards', plus vert-ere - to 'turn'; similarly 'introversion' from intro - meaning 'inwards', plus vert-ere - to 'turn'. Therefore, semantically, we have words simply referring to an outward or inward turning. Applications of the words vary with the user. Thus, in the physical sciences, Simpson (1669), a chemist, used the term 'extraversion' in the context of 'to render visible or sensible the latent constituents of a substance', while Boyle (1691) referred to the 'supposed extroversion or introversion of <sup>1</sup> sulphur'.

In a more strictly psychological sense Coles (1692-1732) used the term 'extraversion' as a 'turning of ones thoughts upon outward <sup>2</sup> objects'.

1. The spellings of extraversion and extroversion are both used throughout the literature and are equally acceptable. The term extroversion, often attributed to Freud, was, however, adopted almost two hundred years before him. [extro versio is the Latin equivalent to extra vert-ere; Murray (1897) quotes the French, and Johnson (1755) the Latin].
2. See Murray (1897).





Samuel Johnson (1755) defined 'extraversion' as 'the act of throwing out; the state of being thrown out', and quotes Boyle (previously mentioned).

Whitney (1899) interpreted 'introversion' as 'the act of introverting, or the state of being introverted; a turning or directing inward, physical or mental', and quoted Berkeley (Guardian, No. 89) as having said 'This introversion of my faculties, wherein I regard my own soul as the image of her Creator'. That introversion is also a physical term Whitney additionally quoted Lankester (Encyclopedia Britannica); 'We find the anterior portion of the polypide can be pulled into the hinder part, as the finger of a glove may be tucked into the hand. It is in fact an introvert'.

The term 'introversion' also appeared in popular writing during the mid-nineteenth century. Thus Lazarus (1852)<sup>2a</sup> related that "The main fact is that of the spiritual and organic introversion, the turning inward of the being to act upon himself" (p. 289). In Lazarus's writing we begin to see the intimation of 'introversion' being associated with a kind of neurotic tendency that was proposed by Freud many years later (Freud, 1920). "The habit of introverted thoughts" suggested Lazarus, "has very morbid tendencies and incapacitates us from appreciating the real values and beauties that surround us" (p. 199).

With this brief historical review on the early uses of the terms 'extraversion' and 'introversion' we see that Coles's use of the term 'extraversion' reflects what was to become Jung's major attitudinal mechanism, while Lazarus's 'introvert' appears as an

2a. Lazarus's work was suggested by A.A. Roback in his excellent review of early character types (see The Psychology of Character, 1927).



early caricature of Freud's 'introversio libidinis sexualis'.

As many previous typologies have been abrogated by that of Jung, it will now be convenient to devote our attention to his work in order to ask, specifically, what is 'EXTRAVERSION'? How has this putative typology or dimension been conceptualized over time and what are its operational referents? With specific concentration on questionnaire media, the vehicle most prominently used to assess this concept, an attempt will be made to investigate these questions.

#### Carl Jung and Sigmund Freud.

In reviewing the literature a singular characteristic appeared to stand out, namely that very nearly all authors, launching forth on a discourse on 'extraversion', have uncritically, accepted the theory that Jung coined and developed the terms 'extraversion' and 'introversion'. Further it has been unquestionably accepted that Jung was addressing 'extraversion' and 'introversion' as 'psychological types'. Rarely does one read of the intimate association between Jung and Freud, and their rather remarkable similarities. As both Jung's and Freud's theories have intimately influenced attempts to measure 'extraversion' and 'introversion' by means of questionnaires, an attempt will be made here to display the differences and similarities prior to a certain confusion which appears to have occurred.

"From 1906 to 1910 Jung gave the appearance of being not only a wholehearted but also a most enthusiastic adherent of Freud's



work and theories" (Jones, 1961, p. 318). Later, however, "In May 1911 Jung told Freud he regarded the term libido merely as a designation of general tension" (p. 321). Jung was, much to Freud's dismay, 'widening' the concept of the libido. The storm clouds were gathering, and in early 1912 their relationship began to break down.

"In 1912 Jung developed a monistic conception of libido in his Transformations and Symbols of Libido" (Weigert, 1942, p. 354). Up to this time Jung had still considered 'introversion' as a turning away of the sexual libido from the real object onto the subject where it promoted unreal phantasy (introversio libidinis sexualis); however with his expanded notion of the libido into one of the unspecific psychic energy, the concept of introversion soon followed.

It was first paired with extraversion and used to form the kernel of a typological theory in an address delivered to the Psychoanalytic Congress in Munich in 1913 and published in the same year in French (Bash, 1955, p. 236).

The complete break with Freud occurred when Jung resigned, as editor of the Jahrbuch (1913), and later (1914) as President of the Psychoanalytic Association (Brill, 1938).

With the development of his own theories Jung (1916) made his attitude toward types absolutely clear. "I must emphasize the statement that this question of types is the question of our psychology and that every further advancement must probably proceed by way of this question" (p. 392).





Jung: Two Mechanisms, Four Functions.

The names and forms in which the mechanism<sup>3</sup> of introversion and extraversion has been conceived are extremely diverse, and are, as a rule, adapted only to the standpoint of the individual observer. Notwithstanding the diversity of the formulations, the common basis or fundamental idea shines constantly through; namely, in the one case an outward movement of interest toward the object, and in the other a movement of interest away from the object, towards the subject and his own psychological processes (Jung, 1923, p. 11).

It is apparent from this quote that Jung, in describing the two mechanisms 'extraversion' and 'introversion', has drawn heavily on previous work, as described in the historical survey, and to this point has neither produced anything new, nor has he spoken of 'personality types'. In order to develop personality types Jung had to present, in addition to his two mechanisms, four functions.

As basic functions, i.e. functions which are both genuinely as well as essentially differentiated from other functions, there exist thinking, feeling, sensation, and intuition. If one of these functions habitually prevails, a corresponding type results. I therefore discriminate thinking, feeling, sensation, and intuitive types. Every one of these types can moreover be introverted or extraverted according to his relationship to the object in the way described...  
(Jung, 1923, p. 14).

It is interesting to compare now these four functions with the three 'acts' philosophized by Plato: learning, anger, and propagation

---

3. "...as I have already emphasized more than once, introversion and extraversion are not characters at all, but mechanisms"  
(Jung, 1923, p. 354).



and nutrition. One does not require too much imagination to see that both these people were addressing the same issues.

In addition, Jung realized that personality could not be described in simple dichotomies.

With the substantiation of introversion and extraversion an opportunity at once offered itself for the differentiation of two extensive groups of individuals. But this grouping is of such a superficial and inclusive nature that it permits no more than a rather general discrimination. A more exact investigation of those individual psychologies which fall into either group at once yields great differences between individuals who none the less belong to the same group (Jung, 1923, p. 13).

Extraversion and introversion, as mechanisms, were not contradictory opposites but complimentary and in continuous interplay, one usually characterizing the conscious and the other the unconscious.

In summing his position Jung stated:

I have no desire to give my readers the impression that such pure types exist at all frequently in practice. They are, as it were, only Galtonesque family-portraits, which sum up in a cumulative image the common and therefore typical characters, stressing these disproportionately, while the individual features are just as disproportionately effaced (Jung, 1923, p. 513).

#### Freud: Introversion, A Preliminary Condition for Psychoneurosis.

The flavor of Freud's attitude to Jung's break with him is preserved in a letter Freud wrote to Ernest Jones shortly after the break.

It may be that we overrate Jung and his doings in the next time. He is not in a favorable position before the public when he turns against



me: i.e., his past...I expect no immediate success but incessant struggling. Anyone who promises to mankind liberation from the hardship of sex will be hailed as a hero let him talk whatever nonsense he chooses (Jones, 1961, p. 326).

Freud was very much in disagreement with Jung's enlarged view of the term introversion, and felt that it was 'illegitimate'. Freud (1949) himself defined introversion as a substituting for actual objects of phantasies for those objects, by supposing that the neurotic had ceased to direct his motor activities to the attainment of his aims in connection with real objects. "Introversion is one of the invariable and indispensable preliminary conditions in every case of psychoneuroses" (Vol. II, p. 315). Since this was the only application of the term introversion which Freud considered 'legitimate', it followed that for him Jung's larger use of the term was 'indiscriminate' (Vol. IV, p. 31).

Even with Jung's expanded view of the libido and psychic energy, how far was his theory conceptually, from Freud's? Some contemporary Freudians see Jung's conceptions as 'sheep in wolves clothing'.

...Freud's earliest theories regarding primitive mental function postulated movements of instinctual energy from one psychic position to another, the forward flow representing a movement towards discharge (gratification) and the backward flow a regression towards earlier positions. The only difference between these movements and the movements described by Jung as extraversion and introversion is that in the Jungian system extraverted and introverted energies are thought of as moving forth and back between the self and the not-self, between subject and object (Glover, 1965, p. 81).





This necessary digression, in elaborating these points between Jung and Freud, is of importance in helping the reader to avoid the confusion into which so many psychologists seem to have fallen, namely that Freud's definition of introversion has been widespread in the work of writers and researchers interested in extraversion and introversion concepts. Further, Collier and Emch (1938) have pointed out that "...paradoxically enough, they (psychologists) seem to regard this definition as a natural extension of the concept of Jung, rather than a rigid contraction both in meaning and in use" (p. 1047). As will be seen the Freudian sense of introversion was quite commonly used during the pre-metric era, during which in many studies introversion was associated with 'neurotic tendency' or melancholia. Two illustrations of this point are as follows:

- (1) Yet another prominent feature in the literature on types is the way in which the perseverating, secondarily functioning, subjective, introverted, systematizing and excessively scrupulous person is portrayed as tending furthermore towards being melancholic (Spearman, 1927, p. 53).

- (2) White (1916) maintained that introversion is a regression to an earlier way of thinking (i.e., Freud's 'regression towards earlier positions'); introversion types of psychoses demonstrate a reversion to ways of thinking that belong to earlier stages of development. Withdrawal from reality is a withdrawal from contact at higher levels but a return to phylogenetically older and more diffuse forms of contact. Extraversion is allied to the process of individuation.



### Extraversion-Introversion: Pre-metric Considerations.

Such a name as lag, perseveration, secondary function, or introversion only serves in the first place to bring together an indefinitely large class of mental tendencies. It does not (pending further evidence) indicate that all the tendencies falling within this class will vary proportionately in any individual. Yet correlation it is that we need, if the whole class of tendencies is to be treated as a single-behaviour unit and measured, or even described, for this individual by a single value or statement (Spearman, 1927, p. 53).

With Jung bringing his 'new terminology' to the attention of the academic world there followed a spate of theorizing upon the topic of extraversion and introversion.

Wells (1917) considered introversion to be the avoidance of unpleasant external effort by seeking satisfaction within the self, in imagery and daydreaming. Tansley (1920) viewed extraversion as a biological adaptation of the mind with introversion as being, primarily, a lack of such adaptation. Kempf (1921) proposed that extravert-introvert differences were to be found in the central nervous system. Introverts, with a more highly developed and dominant central nervous system, were more subject to inhibitions and tended to be moody, self-conscious, irritable, eccentric, cautious, deliberative, and uncreative. By inference, extraverts would possess the opposing tendencies. Allport (1921) made a distinction in terms of overt behavior; the extravert's mental images, thoughts, and problems find ready expression in overt behavior, while the introvert, on the other hand, dwells largely in a world of imagination, creating inwardly a more desirable 'ideal' world rather than adjusting himself



outward to the real one. Impulsiveness was the mark of the extravert for Nicoll (1921). The extravert acts on the spur of the moment and throws himself into the heart of things as a participant, not as a spectator. Per contra, the introvert is asocial and finds life continuously hostile; unless he finds a means of 'extraversion' he may ultimately live in a world of phantasy of his own making.

For McDougall (1921) the flow of emotions was the key. The well-marked extraverts are those whose emotions flow out easily into bodily expression and action. The introvert is slow and reserved in the expression of emotions; he becomes dead to the outer world, languid, absorbed, self-centered, and full of vague distress.

Hinkle (1922) one of the principal translators of Jung's works<sup>4</sup>, divided introverts and extraverts into three groups: the objective, the simple, and the emotional or subjective. She also related that introverts and extraverts might be confused through their assuming some of the traits of the opposing 'type' because of the prevailing family or national psychology<sup>5</sup>.

Conklin (1923) suggested that some individuals might be neither predominantly introverted nor extraverted, and moved that the term 'ambiverted' be applied to these cases.

Freyd (1924) propounded the theory that the extravert is a calloused individual who makes good impressions on others and cares

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4. The 'Psychology of the Unconscious' (1921).

5. Here is an early indication of what is contemporarily termed 'spurious extraversion', found particularly amongst college students (Browne, Howarth, and Skinner, 1970; Skinner, Howarth, and Browne, 1970).





little what others say about him. The introvert, on the other hand, is readily rebuffed by his social environment, and in time, develops an asocial 'set'.

Introvert: An individual in whom exists an exaggeration of the thought processes in relation to directly observable social behavior, with an accompanying tendency to withdraw from social contacts (p. 74).

Extrovert: An individual in whom exists a diminution of the thought processes in relation to directly observable social behavior, with an accompanying tendency to make social contacts (p. 75).

With increasing importance being placed on the concepts of extraversion and introversion through these early years of the 1920's, the additional upswing and importance of their popular usage cannot be underestimated. The term 'extraversion' is still as much a part of everyday popular speech as it is a clinical and research concept, "everyone knows what 'extraversion' means", and many apply it to common personality judgements e.g., the study of occupational stereotypes in terms of this concept, by Howarth (1969). Prior to introversion being reported to be decidedly more associated with creativity, 'extraverts' were confounded with 'well-adjusted' and the 'extravert' long held as the 'ideal' (Cattell, 1965).

Why has the concept of extraversion as a 'personality type' persisted? A comment by Cattell (1933) is relevant here:

There is an intrinsic persuasiveness in an artistically elaborated type picture, which few minds can resist. Once a new type distinction has been advertised and discussed, it continues, however faulty it may be from





an objective standpoint, to distort reality to its own image and to acquire convincingness with constant use (p. 308).

This brief summary of the pre-metric era will hopefully have conveyed a general impression of certain early formulations of extraversion and introversion. It is noteworthy in that at this time a simple test to 'measure' extraversion had not been forthcoming and the writers referred to above were quite satisfied to offer highly subjective descriptions for incorporation into their respective systems.

We may now proceed to the early attempts to establish this concept on a firmer basis through questionnaire media.

#### EARLY METRIC CONSIDERATIONS.

##### Extraversion-Introversion: Early Metric Considerations.

A string of raw facts; a little gossip and wrangle about opinions; a little classification and generalization on the mere descriptive level...not a single proposition from which the consequences can causally be produced. This is no science, it is only the hope of a science (William James; in Spearman, 1937, Vol. II, p. 3).

The first attempts to measure 'extraversion' come between the somewhat loosely speculative pre-metric period, and the more empirical methods of the metric era. Therefore, we will now discuss the transitional period in which the early descriptive terminology was transformed into the embryonic items and item aggregations from which arose questionnaire measures.

One of the earliest to pioneer the questionnaire assessment of



extraversion-introversion was Freyd (1924). Working with a New York advertising company, the J. Walter Thompson Co.,<sup>6</sup> Freyd determined to "...examine closely the sense in which the terms (E and I) are used, and to decide whether or not they are to be received into the fold of legitimate psychological categories" (p.74). The author collected, from several 'psychologists of standing' and graduate students in psychology, lists of what they considered the traits of the introvert and the extrovert. "There is considerable agreement among the various contributors, which would point to a popular recognition and identification of the types were it not for the fact that these men had learned of the types from the same literary sources" (p. 78). The list was composed of 54 traits of introverts since "those of the extrovert would merely be the opposites of these" (p. 78). The trait content of the 'Freyd List' of considerable importance as the foundation of future questionnaires, is presented, in its entirety below.

#### The Freyd List (1924)

1. Blushes frequently; is self-conscious.
2. Avoids all occasions for talking before crowds; finds it difficult to express himself in public.
3. Prefers to work alone rather than with people; prefers to work at tasks that do not bring him into contact with people.
4. Dislikes and avoids any process of selling or persuading anyone to adopt a certain point of view (except in the religious field).
5. Takes up work which requires painstaking and delicate manipulation.

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6. At about the same time another psychologist of considerable fame was employed by this company; John B. Watson.



6. Hesitates in making decisions on ordinary questions that arise in the course of the day.
7. Introspects; turns his attention inward.
8. Depreciates his own abilities, but assumes an outward air of conceit.
9. Is critical of others.
10. Is extremely careful about the friends he makes; must know a person pretty thoroughly before he calls him a friend.
11. Limits his acquaintances to a select few. (This may be beyond his control).
12. Has ups and downs in mood without apparent cause.
13. Has ups and downs in mood with apparent cause.
14. Works by fits and starts.
15. Worries over possible misfortunes.
16. Feels hurt readily; apparently sensitive about remarks or actions which have reference to himself.
17. Is outspoken; says what he considers the truth regardless of how others may take it.
18. Keeps in the background on social occasions; avoids leadership at social affairs and entertainments.
19. Is absent-minded.
20. Is reticent and retiring; does not talk spontaneously.
21. Shrinks when facing a crisis.
22. Prefers to work things out on his own hook; hesitates to accept or give aid.
23. Is meticulous; is extremely conservative about his dress and painstaking about his personal property.
24. Prefers participation in competitive intellectual amusements to athletic games.
25. Is a poor loser; considerably upset and indisposed after the loss of a competitive game.





26. Makes mistakes in judging the character and ability of others.
27. If he unburdens at all, he does so only to close personal friends and relatives.
28. Indulges in self-pity when things go wrong.
29. Day-dreams.
30. Limits his acquaintances to members of his own sex.
31. Is persistent in his beliefs and attitudes.
32. Shrinks from actions which demand initiative and 'nerve'.
33. Gets rattled easily; loses his head in excitement or moments of stress.
34. Expresses himself better in writing than in speech.
35. Is governed by reason rather than impulse or emotion. Is a good rationalizer.
36. Derives enjoyment from writing about himself.
37. Is thrifty and careful about making loans.
38. Is conscientious.
39. Resists discipline and orders.
40. Admires perfection of form in literature.
41. Is sentimental.
42. Rewrites his social letters before mailing them.
43. Pays serious attention to rumors.
44. Believes in 'mind' cures; accepts an idealistic philosophy.
45. Talks to himself.
46. Keeps a diary.
47. Is strongly motivated by praise.
48. Is selfish.
49. Is slow in movement.



- 50. Prefers to read of a thing rather than experience it.
- 51. Is suspicious of the motives of others.
- 52. Is effeminate (if a man).
- 53. Is a radical; wants to change the world instead of adjusting himself to it.
- 54. Is creative of new and sometimes eccentric ideas and things.

In conclusion Freyd stated that "To find a place in the body of psychological knowledge the theory must be expressed with less inconsistency and with more attention to experimental evidence" (p. 87). The use of the list as an experimental 'tool' was yet to come.

On the assumption that extraversion and introversion existed, clinicians began to devise rating scales to determine upon those individuals in need of 'mental hygiene'<sup>7</sup>. Two more prominent rating scales were those of Laird (1925) and Marston (1925). In research, however, it was Edna Heidebreder who provided a breakthrough.

Heidebreder (1926) felt that the most interesting feature of Freyd's work was his list of 54 specific trait characteristics.

It is, in a sense, a condensation and crystallization of professional opinion on the subject ...This list at once suggests the desirability - and, what is more to the point, the possibility - of submitting some of the questions of introversion and extroversion to an experimental test. In fact the list itself may be made an instrument for such a procedure... What information can be gained about intro-

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7. Goldberg pointed out that the conception of E-I constructs, as important determinants of behavioral differences among psychiatric patients, enjoyed wide popularity in the 1920's (Goldberg, 1970).



version and extroversion by applying this scale to a group of normal individuals as an instrument of measurement? (p. 120).

The 100 men and 100 women tested did not fall into 2 distinct groups of 'extraverts' and 'introverts', but into a single group which took the form of a normal probability curve. On the basis of comparing the 25% most introverted with the 25% most extraverted subjects, the author then arranged the items on the list in terms of their 'most diagnostic' value. Thirty-one traits (items) were found to be diagnostic on every count, according to self, associate's, and combined ratings.<sup>8</sup> Heidbreder, therefore, concluded that certain items from the Freyd List could be used as an instrument for distinguishing between introverts and extraverts. "Evidently the traits form a set of reactions which are consistent with each other, and which, taken together, constitute a fairly definite general attitude" (p. 134).

In an endeavor to assess 'normal' extraversion-introversion differences Conklin (1927) developed an 'E-I Interest Ratio' based on a list of proposals presented in infinitive form: to play baseball, to talk with friends about literature etc. Twenty of these proposals had been statistically determined to be significant to extreme extraverts and twenty to extreme introverts scores. The ratio of the sum of the reactions to the extravert 'items' to the sum of the

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8. The most diagnostic items on the Freyd List, in order of diagnostic value, were items number: 11, 16, 51, 15, 28, 33, 18, 9, 3, 12, 23, 1, 43, 34, 39, 30, 2, 53, 17, 7, 24, 47, 29, 48, 4, 41, 10, 32, 45, 36, and 46 respectively.



introvert 'items' determined the 'E-I Interest Ratio'.<sup>9</sup> Three hundred and fifty-two college students served as subjects. This observation of Conklin's is of considerable importance:

I am well aware that the determination of individual differences in extraversion-introversion interests cannot tell the whole story about normal extraversion-introversion. In the preliminary experimentation from which the present method was developed there promptly appeared reactions which involved the self and social adjustment. Undoubtedly this self adjustment factor is a very important one and very likely has much to do in the determination of the kind of interests which develop in any individual (p. 29).

Despite the existence of these studies in the literature Guthrie (1927) was impressed by the fact that evidence for the existence of extraversion-introversion was conspicuously absent. "Is there a dimension of human personality corresponding to introversion-extroversion?" (p. 84). In order to investigate the matter he administered Laird's mental hygiene test, a test of campus information or gossip, the ability to approximate the group judgement of their teachers; all as 'extraversion' tests, plus grade point averages and intelligence scores taken from university records, to 365 students. Unfortunately, none of the putative 'extraversion' tests showed any appreciable correlation with any other, which led him to comment that:

If either scholarship, or rapport with current gossip, or a tendency to conform to group judgement of persons, or a tendency to conform to common verbal associations; or to answer personal questions as others do -

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9. Unfortunately Conklin did not publish his list and copies were no longer available from the University of Oregon Press.





if any of these is a measure of extroversion,  
it would seem that no one of the others  
can be (p. 87).

Thus, with respect to the evidence for the existence of extraversion-introversion, the author was forced to the conclusion that: "We may all find some personal pleasure in the use of Jung's types as occasional descriptive epithets, but their common use and application to normal persons should be avoided until we are much more certain of our ground" (p. 88).

"Knowing full well that it was desirable to have a simple test which would have clinical and general significance", Neymann and Kohlstedt (1929, p. 483), acknowledging the earlier work of Travis (1925), selected 100 statements half of which were 'theoretically pleasing' to 'extraverts' and half to 'introverts'. These statements were then administered to 100 manic-depressive and 100 schizophrenic patients, and a bimodal curve, representative of the manic-depressive and the schizophrenic group respectively, was obtained. On further testing normal subjects ('over 200') a similar bimodal distribution of scores resulted with very few borderline cases. The test, named the Neymann-Kohlstedt Test for Introversion-Extroversion, is reproduced below in its final 50 item form. (Note: (1) the similarity in item content with the Freyd List; (2) the authors do not acknowledge Freyd.)

#### The Neymann-Kohlstedt Test (1929)

1. Be by yourself a great deal
2. Think of life in terms of pleasure
3. Always be calm and collected



4. Have a great deal of confidence in others.
5. Think or dream of what you will do five years from now.
6. Stay at home during a social affair.
7. Work with many people around you.
8. Do the same kind of work all the time.
9. Enjoy social gatherings just to be with people.
10. Think a great deal before deciding anything.
11. Accept suggestions rather than working them out for yourself.
12. Quiet rather than exciting amusements.
13. Dislike having people watch you.
14. Quit a tiresome task.
15. Save money rather than spend it.
16. Seldom (Infrequently) analyze your thoughts or motives.
17. Indulge in reverie (day-dream) or thought.
18. Have people watch you do things that you do very well.
19. Let yourself go when angry.
20. Work better when people praise you.
21. Have excitement.
22. Often meditate and think about yourself.
23. Be a leader at a social affair.
24. Speak in public.
25. Do the things that you dream about (day-dream).
26. Rewrite social letters.
27. Get things done very quickly rather than being slow and sure in movement.
28. Think a great deal.



29. Be able to express your keenest feelings (joy, sorrow, anger, etc.).
30. Pay little attention to details.
31. Be exceedingly careful in meeting people.
32. Associate freely with people holding views opposed to your own.
33. Puzzles.
34. Act on suggestions quickly rather than stopping to think.
35. Read about rather than do a thing.
36. Enjoy the story more than the way it is written.
37. Keep a personal diary.
38. Keep quiet when out in company.
39. Act on the spur of the moment.
40. Dislike thinking about yourself.
41. Always plan out work before you begin it.
42. Change from one type of work to another frequently.
43. Avoid trouble rather than face it.
44. Believe that rumors are important.
45. Confide in others.
46. Distrust people you have just met until you get better acquainted.
47. Study others rather than yourself.
48. Spend your vacation at some quiet place rather than at a lively resort.
49. Change your opinions easily even when formed.
50. Take an active part in all conversations going on around you.

In order to make a more definitive description of extraverts and introverts, Oliver (1930) administered the Laird test "as the readiest means of selecting individuals whom many would agree





in calling extroverts and introverts" (p. 347), as part of a larger test battery (intelligence tests, likes and dislikes, interests, etc.). "An examination of the tests themselves shows that the Laird test is largely, although not exclusively, concerned with the subject's social relations - his modes of feeling, thinking, and acting towards his fellows" (p. 353). Additional tests showed the 'extraverts' to be more masculine while the 'introvert' group were more liberal in their opinions on economic issues. The author suggested that this more definitive description of 'extraverts' and 'introverts' should facilitate the construction of more adequate tests of extraversion and introversion.

These case studies suggest that no one cause will readily account for all the manifestations of extraversion and introversion. The concepts of extravert and introvert do seem to correspond to coherent sets of characteristics; but it must never be forgotten that within each group of individuals there are great individual differences (p. 363).

Gilliland and Morgan (1931) observed that individual differences in more complex traits were difficult to determine.

This is due both to the problem of test construction and to the difficulty of evaluating the test after it has been constructed. Because objective criteria are hard to discover, the development of personality tests has been especially difficult...there is a growing dissatisfaction with the use of such crude criteria as rating scales and the personal opinion of testers and others for the validation of tests (p. 296).

The authors reported an 'intensive study' of the items on the Neymann-Kohlstedt Test and after 'considerable statistical study', reduced



the number of significant items to 35. Items were originally scored on a 5 point scale ranging from extreme approval to extreme disapproval or aversion but following administration of the test to a group of normal individuals, it was found that there was a tendency to answer all the items in the central category. To obviate this difficulty the items were presented, in the final form of the test, with a dichotomous 'yes' - 'no' answer format, and the test was named the Northwestern University Introversion-Extroversion Test. As evidence for the validity of their test, Gilliland and Morgan reported a bimodal distribution of E-I scores among psychiatric patients (most of the schizophrenics falling within the introverted mode and most of the manic-depressives falling within the extraverted mode), as contrasted with a normal distribution of scores among college students.

Commenting on the E-I scales then in current use, and on Jung's original formulations, Woodworth (1931) observed that at least two variables lumped together in the measures: (1) the tendency to immediate overt action (i.e., impulsiveness), and (2) social activity. Many years later Mann (1958), Carrigan (1960), Eysenck and Eysenck (1963), and others, were to arrive at a similar conclusion.

It was Bernreuter's contention that far too small a proportion of the attention which had been given to the matter of personality traits had been directed toward the devising of adequate tests. "The demands for results have been so urgent that in many instances inadequate devices have been widely used, both for research and for guidance purposes" (Bernreuter, 1933, p. 387). Using a new method,



termed the method of 'differential evaluation', consisting of the determination of the extent to which the response to a single question is symptomatic of each of several traits, the author selected items from a number of sources including Woodworth, Laird, Freyd, Allport, and Oliver, and constructed a 4-scale (i.e., putative scale) 125 item inventory. The four scales were: (1) neurotic tendency, (2) self-sufficiency, (3) introversion, and (4) dominance. Since each scale had several items in common it is not surprising that the results of administering the inventory displayed very large correlations obtaining between neurotic tendency, introversion and dominance. Neurotic tendency and dominance correlated  $-.83$ ; neurotic tendency and introversion  $.96$ , and introversion and dominance  $-.72$ . That this test was very nearly a 'pure' measure of 'neurotic tendency' was well borne out by a later factor analysis of the scales by Flanagan (1935), to be reported in Chapter Two; yet this test was utilized repeatedly by clinicians and researchers, in order to (supposedly) obtain an 'introversion' score.

Stagner and Pessin (1934) saw, as the major problem in personality test construction, the selection of valid and reliable items. "...one must select items which on repetition will yield the same results, which test the alleged traits, and which adequately differentiate those possessing introvert tendencies from those having extravert tendencies" (p. 321). One hundred and forty items were selected from Marston, Laird, Freyd and Heidbreder, Conklin, and Neymann-Kohlstedt, and combined in the form of a questionnaire





consisting of two parts; personal preferences and personal habits. One hundred and seventy-one male students served as subjects. Results suggested that of the 70 personal habits 25 were diagnostic of extraversion, while 27 of the personal preferences displayed significant diagnostic values. The most diagnostic items are reproduced below.

Stagner and Pessin Test (1934)

Items in the Interests Group Having Greatest Diagnostic Value  
(Arranged in order)

To spend your vacation at some quiet place rather than at a lively resort.

To compete in intellectual contests rather than athletic games.

To be by yourself a great deal.

To work alone rather than with people.

To have quiet amusements rather than exciting ones.

To write a paper on the characteristics of contemporary novels.

To look at pictures of airplanes.

To keep quiet when out in company.

To visit an automobile show.

To go to social gatherings just to be with people.

To take an active part in all conversations going on around you.

To work with many people around you.

To examine the details of some new kind of machinery.

To rewrite letters before mailing them.

To change often from one type of work to another.

To listen to a lecture on the history of painting.





To read about airplanes.

To confide in others.

To look at a window display of carpenter tools.

To stay at home during a social affair.

To talk to yourself.

To limit your acquaintance to a select few.

To listen to a lecture on classical music.

To play baseball.

To convince others of your point of view (omit questions of religion).

To have people watch you do things that you do very well.

To have excitement.

Items in the Personal Habits Group Having Greatest Diagnostic Value  
(Arranged in order)

Are you habitually absentminded?

Are your feelings hurt by remarks or actions referring to you?

Do you often worry about possible misfortunes?

Are you often self-conscious in front of strangers?

Are you introspective (turn your attention inward to your own thoughts and ideas)?

Do you often hesitate on making decisions in the ordinary course of the day?

Are you often considerably upset when unsuccessful in any undertaking?

Do you usually enjoy the story rather than the way it is written?

Do you usually pay serious attention to rumors?

Have you often avoided members of the opposite sex?

Do you often brood over failure in a game or recitation?

Are you often sentimental?



Do you usually think a great deal before deciding anything?

Are you ordinarily extremely careful about the friends you make  
(must know one very thoroughly to call him a friend)?

Have you usually made friends with ease?

Do you often indulge in self-pity when your luck is bad?

Have you usually expressed yourself best in writing?

Are you usually critical of others?

Do you often act on suggestions quickly, rather than stopping to think?

Do you indulge much in day-dreams?

Are you a radical (do you want to change the world instead of adapting yourself to it)?

Can you remember most of the errands and details of your daily routine?

Do you usually talk spontaneously?

Do you usually succeed at selling?

Do you blush readily?

The authors concluded that:

...our habits questions...give the most diagnostic behavior-units for differentiating introverts from extraverts along the lines originally laid down by Jung. The interest questions...measure some characteristic which is related to self-sufficiency, and indeed might represent an overlapping of a test of intellectual-active interests and one of social-seclusive behavior (p. 324).

#### Considerations on the Pre- and Early Metric Periods.

A brief examination of the various tests presented above, from Freyd (1924) to Stagner and Pessin (1934), indicates a degree of



similarity which might be expected when one considers that they have, in large part, arisen from common sources in the literature. The items, representing transformations of early subjective descriptions, appear to center around the issues of social relations, emotionality, impulsiveness, self-consciousness, daydreaming, and sex relations. Ironically, when these tests are administered as 'measures' of extraversion and introversion, no two authors agree upon just exactly what is being measured! Common sources of disagreement would appear to be: (1) differences in the conceptualization of the terms 'extraversion' and 'introversion'; (2) 'normal' vs. 'psychiatric' samples tested; (3) the use of putative items vs. putative scales; (4) differences in statistical procedures adopted; (5) differences in agreement as to the interpretation of putative items, and (6) differences in scoring and interpreting the tests.

Whatever the cause or causes, the differences in scores are so great that the various authors of tests should come to some agreement on what is meant by the tests...or produce a better test of the trait before foistering any more tests at so much per on the all too gullible public...Until widespread publication is suppressed and care exercised in construction, so-called personality tests cannot hope to gain the general respect of psychologists and administrators or others in positions of responsibility (Gilliland, 1934, p. 411).

Considerable confusion existed at the end of the early metric era, prior to the beginning of the metric era and the application of factor analysis. Investigators have been unable to say whether there is indeed a dimension of personality that can be named 'extraversion-introversion' upon which some degree of common acceptance can be





obtained.

It may be of importance, in concluding this chapter, to indicate that possibly the most outstanding characteristic of this era, not previously elaborated upon in the literature, was the somewhat parallel attempts in psychology and psychiatry to formulate concepts and construct questionnaires and rating scales for extraversion and introversion. The development in psychology had arisen through testing student populations with the emphasis on 'normality', and followed more closely along the lines advocated by Jung. On the other hand, tests and rating scales developed by psychiatric researchers, relied on the concepts of Freud with the emphasis on psychopathology and 'mental hygiene', and were administered to psychiatric populations. The results appear to be a confounding of the two developments with the unfortunate effect of researchers and writers not making adequate distinctions between the two approaches. Consequently the concept of normal 'extraversion' versus, very often, neurotic 'introversion' has persisted up to the present.

Where should the emphasis on 'extraversion' and 'introversion' be placed? Some based the distinction between 'extraverts', and 'introverts' on the direction of interests of the individual; others on the way in which the emotions run their usual course in terms of overt actions versus inhibitory behavior; still others emphasized the social aspects. Reading the literature one is left to speculate whether these three aspects, intellectual, social and emotional really belong within a single 'dimension' of personality, or whether if they do not, extraversion and introversion is coincident with any



of them.

Guilford (1934), in surveying the literature, and this brings us to the end of the pre-metric and early metric eras and to the beginning of the metric era, concluded that:

...personality is a multidimensional affair...in the usual test several related dimensions have been confused and forced together to form a single somewhat fictitious continuum...no measurement of IE, or any correlation involving IE means much unless the name of the test is given (p. 334).



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We cannot expect to achieve a systematic view of personality until scientific investigation is able to contribute more to our knowledge of it than it has done so far.

[Philip E. Vernon, Character and Personality, 1935, 4, p. 3].



## CHAPTER TWO

## METRIC CONSIDERATIONS OF 'EXTRAVERSION'

Early Considerations for a Multivariate Trait Approach.

We need very much to know whether there are such constellations of habits, tendencies or dispositions which can be called extraversion and introversion...The technique of Spearman for testing for general, group and specific factors may be applicable in this case, and may solve the riddle of personality traits in general. Having established the reality of such traits as extraversion and introversion, we are ready to look for simple objective tests and for some physiological basis for them (Guilford and Braly, 1930a, p. 105).

The Early Contributions of J.P. Guilford.

The work of J.P. Guilford emerges from the early metric era and brilliantly begins the metric era by ushering in the notions of multivariate itemetric trait concepts in personality research. Guilford's contributions<sup>1</sup>, forming the nucleus for future generations of researchers, demonstrate extraordinary prescience, and cannot be overstated.

Guilford's first foray into the realm of questionnaire construction was a test for the classification of students in chemistry at the University of Nebraska. "The test...gave such gratifying results that the writers feel justified in reporting their experience with it" (Hyde and Guilford, 1925, p. 196). The ensuing article was Guilford's first publication.

Following the publication of Spearman's classic book in 1927,

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1. See Browne and Howarth, 1971.



Guilford perceived that the factor analytic method might provide a solution to the problems of trait dimensions which had been confronting him and others. Later, as we shall see, Thurstone's (1931) multiple factor theory seemed more promising to him.

Guilford's initial involvement with the concept of extraversion-introversion was quite incidental:

One day at Cornell, Samuel Feldman, an instructor, having been reading McDougall's new Outline of Abnormal Psychology (1926), jokingly remarked that McDougall had solved the problem of introversion-extraversion and had developed a good test for that trait...I instigated some student research on McDougall's theory and his tests... These studies led to the conviction that several disparate phenomena were then erroneously regarded as belonging under the single concept. Common American conceptions were in general agreement that Jung's types should be regarded as opposite poles of a continuous dimension. It seemed obvious that factor analysis was the way in which to determine whether there was a single dimension of introversion-extraversion or whether more than one dimension is involved (Guilford, 1967, pp. 181-182).

Following some earlier attempts to research extraversion and introversion concepts (Fluctuation of the outline cube, using Marston's Rating Scale and the Neymann-Kohlstedt Test; Guilford and Braly, 1930b; Fluctuation of the outline cube and the patellar reflex, using Marston's, Neymann-Kohlstedt's, and Laird's tests as criterion instruments; Guilford and Hunt, 1931), Guilford, with his wife as co-worker (Guilford and Guilford, 1934), after due consideration, decided that the available tests and rating scales were "almost worthless" (p. 378).



Such a state of affairs demands that the whole concept of the aspect of personality here under question should be carefully re-examined and if possible empirically justified (p. 378).

In order to construct a more adequate item pool, which would then be studied further, the authors chose items based upon certain descriptive phrases of Jung, the Freyd List, Laird's Mental Hygiene Test, Marston's rating scale, the Neymann-Kohlstedt Test, and the Northwestern E-I Test. In its original form their item pool consisted of 75 non-repeated items, each supposed to be diagnostic of 'extraversion' by at least one of the above writers. (56 of the items had been considered to be diagnostic by two or more authors). By selecting those items upon which there was most agreement and least duplication between the sources, the Guilfords eventually selected 35 items for their test. Sex (male-female) was included as the thirty-sixth item. The entire test is reproduced below.

Guilfords' "Typical Test" of E-I (1934)

1. Do you express yourself better in speech than in writing?
2. Are you inclined to limit your acquaintances to a select few?
3. Do you generally prefer to take the lead in group activities?
4. Do you prefer to read about a thing rather than experience it?
5. Do you like work which requires considerable attention to details?
6. Are you generally very particular about your personal property, i.e., do you take very good care of your things?
7. Are you inclined to be considerate of other people's feelings?
8. Are you inclined to act on the spur of the moment without thinking things over?





9. Have you ever kept a personal diary of your own accord?
10. Do you work much better when you are praised?
11. Do you like to change from one type of work to another frequently?
12. Are you inclined to study the motives of others?
13. Do you day-dream frequently?
14. Do you prefer to work with others rather than alone?
15. Are you inclined to worry over possible misfortunes?
16. Are you frequently somewhat absent-minded?
17. Do you like to persuade others to your point of view?
18. Are you inclined to keep in the background on social occasions?
19. Are you more interested in athletics than in intellectual things?
20. Do you usually dislike to change opinions you have already formed?
21. Do you like to speak in public?
22. Do you prefer to work things out for yourself rather than accept suggestions from others?
23. Do you have frequent ups and downs in mood, either with or without apparent cause?
24. Are you inclined to be slow and deliberate in movement?
25. Are your feelings rather easily hurt?
26. Do you enjoy getting acquainted with most people?
27. Are you inclined to keep quiet when out in company?
28. Do you adapt yourself easily to new conditions, i.e. to new environments, situations, places, etc.?
29. Do you like to confide in others?
30. Do you express such emotions as delight, sorrow, anger, etc., readily?
31. Are you inclined to think about yourself much of the time?
32. Do you like to have people watch you when you are working?



33. Do you frequently rewrite social letters before mailing them?
34. Do you like to sell things?
35. Do you get rattled easily in exciting situations?
36. Are you a male?

The test was administered to 430 male and 500 female undergraduate students. Items were intercorrelated by means of 'contingency coefficients'<sup>2</sup> and the resulting matrix was then factored using the Spearman-Dodd technique<sup>3</sup> (Spearman, 1927; Dodd, 1928) in order to determine (1) whether or not there was a general factor running throughout the entire list of 36 items, and (2) whether there were any group factors in addition which needed to be assumed to account for all the correlations between the items. The results indicated that there was no universal general factor (analogous to 'g') extending throughout all the items and that a number of common (group) factors had to be assumed to account for the obtained correlations.

Thurstone's (1931) method of factor analysis, which was then in its early stages of development, was subsequently applied to the data. Eighteen group factors were extracted of which four, the authors' felt, were worth of mention. (1) The first factor was marked by such salients as: enjoys getting acquainted with people; prefers to lead in group activities; likes to speak in public, and likes to sell things and was interpreted as Social Introversion-

2. The contingency coefficient is a phi coefficient 'corrected' for the number of cells and class index. (See Kelley, T.L. Statistical Method, 1924).
3. The correlation of each item with an assumed 'g' factor and the corresponding weight for each item was obtained by this method.



Extroversion. (2) The second factor included: feelings easily hurt; likes to confide in others, and expresses emotions freely, and was interpreted as Emotional Sensitiveness. (3) Acting on the spur of the moment; frequent ups and downs in mood, and slow and deliberate, loaded on the third factor which the authors interpreted as Impulsiveness and state that "This has been considered by many as the sine qua non of extraversion" (p. 395). (4) Factor four was interpreted as Interest in Self and had such loadings as; thinks about self much of the time; inclined to limit acquaintances; daydreams; absentminded, and feelings easily hurt.

The authors concluded at the end of this (historically the first) attempt to apply factor analysis to personality items - and they are, of course, asking the same overall question which is being examined in this thesis (37 years later):

Is there a single dimension of personality to be called introversion-extraversion, and to be measured by the several standard tests of this trait? It has been shown that one can force most of the items of this test, and perhaps more extended tests, onto a single continuum. But in reality, our analysis would seem to show that such a procedure is largely fictitious, and that personality is an extremely multi-dimensional affair...a true understanding of the ingredients of ability or personality is to be had only by a rigid analysis of the factors which enter into a large number of single tests or measurements (pp. 398-399).

It is apparent that, from the early metric studies, and the item aggregations arising therefrom, an embryonic personality factor-structure was beginning to emerge.





By 1935 Thurstone had brought his factor theory and computational methods of factor analysis to a higher degree of refinement. In view of this technical advancement the Guilfords (Guilford and Guilford, 1936) thought it worthwhile to apply the improved method to the correlation matrix between their original 36 items in order to determine more precisely the number of common factors and to compute their factor loadings. Five factors were extracted and the centroid axes rotated visually in an attempt to maximize some of the factor loadings which were already large and, at the same time, to maximize the number of zero factor loadings for all the factors.<sup>4</sup> Interpretation of the ensuing factors was carried out in terms of the item content aggregations and produced the following results: the first factor proved to be of a social nature; social participation, social contacts, and social responsibilities, "Until a more exact definition of this dimension is established we prefer to label it simply as factor S" (p. 121). Named Factor E, the second factor was one of emotionality in terms of the expression of emotions and feelings easily hurt. The largest loading on the third factor was 'being a male' with overtones of aggressiveness in additional items, and was named factor M by the authors. The fourth and fifth factors were somewhat difficult to interpret, nevertheless the fourth, marked by carefree-happy-go-luckiness was named factor R (for Rhathymia)<sup>5</sup>,

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4. This represents one of the early applications of Thurstone's principle of 'simple structure' which has since been incorporated into analytic rotation programs, such as the widely used Varimax method.

5. This term, from the Greek 'freedom from care' was suggested by Dean C.H. Oldfather, University of Nebraska.



while in the case of the fifth factor, the item-pattern included interest in intellectual things, inclined to study the motives of others, and preference to working alone, was named factor T. (Thus factors S, E, M, R, and T were identified in a more thorough item-factor-analysis of the original data; 35 items plus sex).

Although this work brings to an end Guilford's specific interests in the extraversion-introversion dimension per se, his factorial work continued toward the development of a primary trait system for multivariate personality assessment. A series of publications appeared in rapid succession describing the discovery of additional factors to the three major ones discussed above (S, E, and M). These included factors D, R, T, and A (Guilford and Guilford, 1939a); and N and GD (Guilford and Guilford, 1939b). The fruits of these endeavors eventuated in the Inventory of Factors STDCR (1940) which "taken together were found to encompass the area of personality traditionally known as introversion-extraversion" (Guilford, 1940, p. 1), and the Guilford-Martin Inventory of factors GAMIN (1943), which greatly influenced Eysenck (1956) in the assembly of items for the Maudsley Personality Inventory. Many of these factor scales were later incorporated into the Guilford-Zimmerman Temperament Survey (1949) [10 factors, 300 items].

At this stage of our discussion it is thus becoming increasingly evident that the concept of extraversion-introversion is not a unitary dimension of personality, nor can it be conceived as a simple dichotomous 'type'. Guilford's highly original research suggested rather that we are dealing instead with a multivariate 'behavioral



picture' involving separable dimensions such as sociability, adjustment-emotionality, impulsiveness and rhythmia. A central problem arises however, which will be reiterated by Eysenck many years later (Eysenck and Eysenck, 1969), namely that, after the initial item-factor-analyses, Guilford did not carry out additional item-factorings on his enlarged item pools (e.g. STDCR, GAMIN and GZTS) to establish that the postulated factors did in fact exist, when all of the items were intercorrelated in a large matrix, and emerge with the correct items having high loadings on these and only these factors. The result was that individual items were scored on each of several putative scales thereby making the originally identified factors inconsistent and complex. Nevertheless, initially, it was Guilford who 'pointed the way', despite his failure to persist beyond his initial identification of certain factors in a number of restricted item pools.

#### An Early Example of Factoring Scales: Flanagan (1935).

In the previous chapter the development of the Bernreuter Personality Inventory, which included 4 putative scales with 125 items overlapping between the putative scales, was reported. Using the intercorrelations between the scales, obtained from 305 eleventh-grade boys, Flanagan applied Hotelling's method of Principal Components (Hotelling, 1933) and obtained four factors.<sup>5a</sup> The first factor accounted for 78% of the variance and included Neurotic tendency .887;

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5a. Factoring of correlations between putative scales is open to serious criticism, one of which is based on the very small number of variables (the putative 'scale' scores) involved.





Introversion .858; and Dominance  $-.833$ , and was interpreted by Flanagan as Lack of Self-confidence. Self-sufficiency loaded .648 on the second factor, accounting for 18% of the variance, and was interpreted as Sociability. The remaining two factors, accounting for 4% of the total variance, had no significant loadings. Judging by the amount of variance accounted for by the first factor, here is evidence that Bernreuter's inventory was, as suggested previously, a measure of 'neurotic tendency'.

Additional Attempts to 'Measure' Extraversion-Introversion (which for methodological reasons, do not represent a general advance on Guilford's work)

Within the early years of the 1940's, and prior to Eysenck's involvement with extraversion-introversion, a number of attempts were made to develop either E-I inventories or scales to assess E-I developed for existing questionnaires. Samples of these attempts, to be briefly alluded to here, include: the Minnesota T-S-E Inventory (Evans and McConnell, 1941); Drake's (1946) Social Extraversion-Introversion Scale for the Minnesota Multiphasic Personality Inventory (MMPI; Hathaway and McKinley, 1943); the Myers-Briggs Type indicator (Myers, 1962), and the Psychological Type Questionnaire (Gray and Wheelwright, 1946).

"The Guilfords' demonstration that I-E items clustered on at least three to five factors stimulated Evans and McConnell into constructing an inventory which would measure three I-E facets--labeled thinking, social, and emotional I-E--as independently as possible" (Goldberg, 1970, p. 39). Two hundred and forty items,





mostly invented by translating the definitions of the three types of extraversion-introversion into specific forms of behavior, were sorted by 'ten experts' into six groups: Thinking Introversion, Thinking Extroversion, Social Introversion, Social Extroversion, Emotional Introversion, and Emotional Extroversion. Note that compared to the Guilfords' empirical approach, these authors have gone in the opposite direction and relied on intuition and personal judgement, a kind of 'eyeball factor analysis'. Following this questionable procedure a correlational analysis of the six putative groups was carried out on 319 students. All of the 240 items were correlated with three a priori scale scores (Thinking, T; Social, S; Emotional, E extraversion-introversion) and the 151 items which correlated highly on their assigned scale scores and had low correlations with the remaining two scales were included in the final version of the inventory. As is obvious, construction of an inventory in this manner is rather reminiscent of the early metric era, and certainly does not indicate an advance over the methodology advocated by the Guilfords.

In certain instances, rather than constructing entire questionnaires, some workers sought to develop scoring scales for extraversion and introversion within existing questionnaire measures. In this manner Drake developed a Social Extraversion-Introversion scale for the MMPI.

An Item Analysis of the Multiphasic Personality Inventory was made by contrasting the percentage responses of two groups of students to the items. One group consisted of 50 students



who obtained centile ranks of 65 and above on the T-S-E Inventory when scored for Social introversion-extroversion. The second group consisted of 50 students who obtained centile ranks below 35 on the T-S-E Inventory (Drake, 1946, p. 51)<sup>6</sup>.

In this manner an already questionable set of putative scales were utilized for the development of a scoring key for social extra-version-introversion for the MMPI. The 70 most discriminating items from the MMPI (norms reported in terms of T scores) were included in Drake's Social Introversion (Si) scale, which was reported to correlate around .70 with the original Minnesota T-S-E scale in a new sample. In obtaining 'norms' for the new scoring key results from an additional 87 female and 81 male students were obtained leading the author to conclude that "The derived key appears to have equally good validity for both male and female students" (p. 53).

By the end of WWII and the development of Drake's Si scale, a Jungian colony had congregated in the San Francisco Bay area of California; their intense interest in Jung's theories, and especially his conception of introversion-extroversion, led to the development of two rather anomalous I-E inventories: Myers and Briggs' Type Indicator and Gray and Wheelwright's Psychological Type Questionnaire (Goldberg, 1970, p. 41).

The construction of the Myers-Briggs Type Indicator was begun around 1942 and after numerous revisions a final Form F appeared in 1962. The authors determined that Jung's theoretical notions had not been adequately reflected in previous extraversion-introversion

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6. The students were all females.



inventories and sought to correct this inadequacy by putting together (the term 'construct' is too empirical to use here) separate indices for determining each of the four basic 'preferences' which were hypothesized to structure the individual's personality: EI (Extroversion or Introversion), TF (Thinking or Feeling), SN (Sensing or Intuition), and JP (Judgement or Perception). Goldberg has made a very succinct statement with regard to Myers' and Briggs' methodology:

The various quasi-theoretical, quasi-psychometric shenanigans used to construct all of the revisions of this inventory are too numerous and too complex to be detailed...(1970, p. 41).

In an analogous attempt to measure three of the four facets in the Jungian typology, Gray and Wheelwright (1946) developed the Psychological Type Questionnaire. The three facets included: Extraversion and Introversion; Sensation and Intuition; Thinking and Feeling-valuation.

The procedure has been to collect on cards all the questions in the literature, and in addition a number devised by us. Each card was studied and a tentative interpretation made of the pair of variables implicated. Many were eliminated because prejudicial in tone, others because obscure, others because duplicates. The remaining questions were mimeographed and submitted to our families and to friends whose psychological types were clear clinically (p. 10).

In the eleventh revision 75 items were presented with a dichotomous response format (e.g., In perceiving things, do you notice - The details, - The effect). It would seem that their methodology is going from the ridiculous to the ludicrous in that here we have an inventory





developed on the responses of families and friends, 'whose psychological types were clear clinically'.

These last two examples (Myers-Briggs, Gray-Wheelwright) have been included only to provide the reader a contrast with the competent early work of the Guilfords who investigated their item pools with sound (though then new) psychometric methods and large subject samples.

#### A Brief Recapitulation.

The number of different, although not equally effective strategies which have been used in constructing putative measures of extraversion-introversion are numerous. Although I have, for historical coverage, described some of these, most of them did not solve the problem of the uni- or multi- dimensionality, or even the existence, of extraversion. At this stage (in the mid-1940's) there was wide agreement that 'something' was there to be tapped, and strong implications of the elemental scales of E-I: sociability, emotionality, adjustment, and impulsivity - were beginning to come through. The operational basis going back some twenty years, was, of course, the item variables in the questionnaires and rating scales but the central problem remaining and which underlay the various disagreements, was the restricted item pools which were being utilized, coupled with the wide variations in testing and statistical analyses. Quite clearly, some systematization, and a clearer theoretical 'lead' or orientation was lacking. It might be said that despite the pioneering factoring, and the multiplicity of other attempts to develop putative extraversion-introversion scales, that psychologists were in a cul-de-sac.



H.J. Eysenck: The Beginning of a System and Hope for the Future.

The nucleus of a system, based on the concept of extraversion-introversion as a truly operationally definable dimension of personality, had its origin (and greatest proponent to-date) with H.J. Eysenck. It is interesting to note that although Eysenck has shown leanings toward experimental psychology, his early work on extraversion was carried out within the context of psychiatry using rating scales of psychiatric patients. Later, Eysenck attempted to relate his questionnaire factor results (MPI, EPI) with experimental-laboratory measures in a number of cross-media studies (Eysenck, 1953; 1957; 1967). It is to his early factorizations that we now turn in order to illustrate the origins of this system, which may usefully be contrasted with the pre-war studies and the then extant theories concerning extraversion.

Seven hundred patients (neurotic male servicemen) were rated by psychiatrists on each of 39 variables (Eysenck, 1944). The results were then intercorrelated and factored. The variables with their resulting factor loadings (i.e. saturations) are shown in Table 1. Of the four centroid factors extracted only the first two, a general factor accounting for 14% of the variance, and a bipolar factor accounting for 12%, were readily interpretable.

The first factor is characterized by a syndrome delineating a general lack of personality integration, lack of adaptability, and lack of drive, and was interpreted as 'neuroticism'. The second factor contrasted two groups of symptoms with the affective, dysthymic, and inhibited on the one hand, and the hysterical or asocial group on



TABLE 1  
Variables and Loadings

Variable.	Factor saturations.				h <sup>2</sup> .
	1.	2.	3.	4.	
1. Age above 30 . . . . .	.08	.14	-.27	-.22	.15
2. Unskilled . . . . .	.22	-.45	.12	-.48	.49
3. Unemployment . . . . .	.55	-.23	-.12	-.36	.49
4. Degraded work-history . . . . .	.16	-.29	.16	-.29	.22
5. Abnormality in parents . . . . .	.47	.21	.35	.31	.48
6. Unsatisfactory home . . . . .	.43	.06	.45	.00	.38
7. Married . . . . .	.21	.39	-.12	-.19	.24
8. No group membership . . . . .	.46	-.40	-.16	-.32	.50
9. Narrow interests . . . . .	.55	-.57	.04	-.10	.63
10. Alcohol . . . . .	.07	.00	.17	-.36	.16
11. Abnormal before illness . . . . .	.61	-.09	.24	.33	.56
12. Badly organized personality . . . . .	.92	-.12	.35	.15	1.00
13. Dependent . . . . .	.65	-.22	.06	.24	.53
14. Little energy . . . . .	.53	-.69	.06	-.24	.82
15. Cyclothymic . . . . .	.46	.31	.00	.37	.45
16. Schizoid . . . . .	.52	-.07	.26	.29	.42
17. Hypochondriacal personality . . . . .	.31	-.22	-.41	.07	.32
18. Obsessional . . . . .	.00	.51	.07	.25	.32
19. Somatic anxiety . . . . .	.05	.25	-.37	.12	.21
20. Effort intolerance . . . . .	.23	.13	-.63	.26	.54
21. Dyspepsia . . . . .	.54	.17	-.36	-.01	.45
22. Fainting, fits . . . . .	.23	-.23	-.42	.23	.33
23. Pain . . . . .	.12	.00	-.39	.03	.16
24. Tremor . . . . .	.30	.34	.17	.10	.25
25. Sex anomalies . . . . .	.14	-.50	.54	-.01	.56
26. Irritability . . . . .	.18	.41	.13	-.10	.23
27. Apathy . . . . .	.18	.48	-.02	-.46	.47
28. Hysterical attitude . . . . .	.38	-.41	.11	-.04	.32
29. Poor muscular tone . . . . .	.47	-.09	-.17	.45	.46
30. Headaches . . . . .	.24	.36	-.15	-.06	.21
31. Anxiety . . . . .	.21	.72	.14	-.09	.59
32. Depression . . . . .	.04	.61	.02	-.23	.42
33. Hypochondriasis . . . . .	.36	-.11	-.79	.24	.82
34. Hysterical conversion . . . . .	.14	-.63	.08	.11	.44
35. Bomb and exposure . . . . .	.02	.10	.03	-.04	.01
36. Wartime separation . . . . .	.36	.23	.39	.23	.38
37. Domestic problems . . . . .	.08	.17	.17	-.19	.11
38. Low intelligence . . . . .	.32	-.25	.03	-.13	.19
39. Boarded out of army . . . . .	.54	.02	.25	.05	.35
Variance . . . . .	.14	.12	.08	.06	.40



the other. The second factor was, in turn, interpreted as a bipolar factor of hysteria-dysthymia.

With the appearance of his book 'Dimensions of Personality' (Eysenck, 1947), Eysenck proceeded to carry out a more detailed description of his factorial results and compared them with Guilford's work by taking the main research on Personality Factors S, E, and M. Using Burt's group-factor method<sup>6</sup>, Eysenck factored Guilford's unpublished tables which he obtained from Guilford, and extracted a general factor accounting for 10% of the variance, and three group factors, accounting for 14% of the variance together.

The general factor was characterized most strongly by the following items: Does not adapt readily to new conditions, likes to read about things rather than experience them, limits his acquaintances to a select few, gets rattled easily, does not like people to watch him, keeps quiet in company, does not take the lead in group activities, does not like to work with others, does not like public speaking, does not like to sell things, is slow and deliberate in movement, keeps in the background on social occasions, and does not enjoy getting acquainted. This factor in many ways resembles our general "neuroticism" factor (p. 39).

If the interpretation of this factor does not rest too comfortably with the reader one suspects that it did not with Eysenck either, for he allocates an entire Appendix in an attempt to 'justify' the interpretation. Much later (Eysenck, 1956) will use some of these very items to form an Extraversion scale on his major questionnaire.

The three group factors were said to resemble Guilford's

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6. The reader should note the absence of any kind of rotation in the early work of Eysenck.





Personality Factors S, E, and M.

But what of Eysenck's second, bipolar factor, hysteria-dysthymia (as obtained in his 1944 study)? Eysenck determined from the previous literature that introverts were more subjective, showed a higher degree of cerebral activity and a tendency to self-control (inhibition); extraverts, on the other hand, had a more objective outlook, a higher degree of behavioral activity, and a tendency to lack of self-control.

In our experimental work the dysthymic group was found to exhibit the introverted traits ...while the hysterical group was found to exhibit the extraverted traits, and accordingly there need be little hesitation in using the terms Extraversion and Introversion in referring to our two groups (Eysenck, 1947, p. 58).

However, Eysenck is quick to add that:

...it must be clear that we are dealing with the contrast between neurotic extraverts and neurotic introverts; our results cannot immediately be generalized to cover the behavior of non-neurotic extraverts and introverts (p. 58).

There existed a great difficulty in identifying hysteric tendency with extraversion, and dysthymia with introversion, namely that through the development of E-I concepts introversion has been associated with neuroticism, especially in psychiatry, and extraversion identified with sociability. Conversely lack of sociability has been regarded by many, especially in psychology, as introversion. To further cloud the possibility of linking hysteria and extraversion, Henderson and Gillespie (1943) have described the hysterical patient as often emotional, shy and reserved, and a little 'peculiar'; hardly the 'accepted notion' of the 'extravert'. If hysteria is to be



connected at all with the extraversion-introversion concept, in the terms of Henderson and Gillespie's description, it would seem to be more related to the 'lack of sociability' syndrome that is pictured. However, lack of sociability, in turn, is regarded, by many, as an index of 'introversion', and this is, of course, completely contrary to Eysenck's theory: "The main burden of our argument is that lack of 'sociability' must be regarded as an index of neuroticism, not as a sign of introversion" (1947, p. 53).

North (1949) in an oftquoted study, determined that probably the best existing measure of extraversion-introversion was Guilford's Inventory of Factors STDCR. "Guilford's Inventory of Factors STDCR was chosen to measure introversion-extroversion because of the statistical soundness of its construction, and by the fact that its scope of 175 questions apparently affords an ample coverage of the items used in the traditional scales of this area of personality" (p. 355). The author subsequently obtained scale scores from 170 students, intercorrelated them, and factored them by means of Thurstone's centroid method. Two centroid factors were extracted, and following orthogonal rotation, interpreted as cycloid disposition (C), and impulsiveness or freedom from care (R). The implication that 'C' is a measure of 'neuroticism' and 'R' is a measure of extraversion', would later serve as a guideline for the construction of Extraversion (E) and Neuroticism (N) scales in the Maudsley Personality Inventory.

In order to construct the Maudsley Personality Inventory: MPI, Eysenck (1956) administered 261 items from the S, D, C, and R scales



of Guilford's STDCR<sup>7</sup>, and the G, and A scales from Guilford's GAMIN inventories, along with a few items from the Maudsley Medical Questionnaire (see Eysenck, 1947, p. 64). The subjects were 200 men and 200 women of whom approximately half had some tertiary education. After assuming that the 'R' scale was the 'best' measure of extraversion and the 'C' scale was the 'best' measure of neuroticism, each item was separately correlated with both R and C scores within each sex group.

The principles governing the selection of questions were as follows: All items in the N scale should have significant relations with the C scale for both men and women, and insignificant relations with the R scale for both men and women. Items in the E scale, conversely, were chosen in such a way that all had significant relations with the R scale for both men and women, but not for the C scale (p. 131).

Twenty-four questions were selected for the E scale and 24 for the N scale in accordance with the principles above. As a "check on the adequacy of the item analyses on which the selection of items was based a factor analysis was performed" (p. 135). Two orthogonal centroid factors were extracted generally confirming the assignment of the items to the two scales, although several items showed appreciable loadings on the 'wrong' factor or weak loadings on the 'right' factor. "The results of this analysis confirmed the view that selection had in fact succeeded in obtaining two clusters of

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7. Guilford's 'Factor Labels' are: S, Social introversion-extraversion, T, Thinking introversion-extraversion, D, depression, C, Cycloid disposition, and R, Rhathymia. It is of interest to note that Eysenck did not use items from the T scale.  
G is General pressure for overt activity, and A is Ascendence.





items which were independent of each other...The two scales are therefore put forward as promising and useful measures of neuroticism and introversion-extraversion respectively" (p. 139).

A point of considerable importance, especially for future considerations, is Eysenck's hypothesized 'dual nature of sociability' which he extended at the same time he was developing the Maudsley Personality Inventory. He pointed out the important role that sociability had played in the construction of previous questionnaires, in that items indicative of social shyness are prognostic of neuroticism in 'neuroticism' questionnaires, while the same items are prognostic of introversion in 'extraversion' questionnaires. The result is that the two questionnaires appear as being highly correlated. Therefore this complex nature of sociability must be carefully heeded in questionnaire construction. Eysenck then suggested that there are two kinds of social shyness: neurotic and introverted.

To put the hypothesis suggested here in a nutshell, we might say that the introvert does not care for people, would rather be alone, but if need be can effectively take part in social situations, whereas the neurotic is anxious and afraid when confronted with social situations, seeks to avoid them in order to escape from his negative feeling, but frequently wishes that he could be more sociable (1956, p. 121).

Eysenck's 'system' had begun and we will be seeing more of him a little later. In the meantime other investigators were busy with Guilford's items.

Under construction, at about the same time as the Maudsley Personality Inventory, was the Heron Scale (Heron, 1956). Heron saw



the need for a brief, reliable and valid measure for use as a control in the selection of subjects for objective (experimental-laboratory) tests. The 'scale' consisted of two sub-scales: emotional maladjustment, utilizing mainly MMPI items, and sociability, which consisted entirely of items from Guilford's R (Rhathymia) scale. "After elimination of items too American in idiom for general use" (p. 245), 36 were selected which best discriminated between 25 hysterics and 25 diagnosed anxiety state patients, for the sociability scale. (This, as in Eysenck's early work, is another instance of the use of 'hysterics' and 'dysthymics' as criterion groups for E-I. This whole matter has been examined and criticized by Sigal, Star and Franks; 1958, and by Foulds; 1961, as is reported below). Twelve of the 36 items were used as scoring items for the sociability measure. "The term 'sociability' has been selected for this part of the present inventory mainly because it is somewhat less likely than is 'introversion-extraversion' to be narrowly identified with any particular school of thought in contemporary psychology" (p. 245)<sup>8</sup>.

Nevertheless, some key researchers have used the Heron Scale in selecting 'extraverts' and 'introverts' for objective tests (e.g. Corcoran, 1964; whose work served as the basic suggestion for Eysenck's work on the 'unitary nature of extraversion'; Eysenck and Eysenck, 1967). Contrary to Eysenck's previously stated position,

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8. A personal communication with Professor Heron produced the following statement: "The score on this part has always been termed 'sociability' rather than 'extraversion', because I have remained convinced that Eysenck's use of the latter term is unjustified when applied to an inventory score alone, based on items of this kind" (April, 1970).



'sociability' was becoming 'the' measure of 'extraversion', both in his own and in Heron's work, despite Eysenck's belief that he had constructed a true 'extraversion' scale.

Comparing the Maudsley Personality Inventory to a number of inventories including the Minnesota T-S-E Inventory and the Heron scale, Jensen (1958) obtained some highly significant correlations between the scales on these inventories. The 'Extraversion' scale on the MPI correlated  $-.80$  with Heron's Sociability scale and  $.81$  with the Minnesota 'Social extraversion' scale. Further, Jensen reported correlations between the MPI 'Extraversion' and 'Neuroticism' scales which ranged from  $-.04$  to  $-.32$ . The conclusion, with regard to the 'Extraversion' scale, was obvious to the author, "...the E scale of the MPI is a measure of only one aspect or type of extraversion, viz., social extraversion" (p. 324). A further result reported by Jensen was that hysterics and dysthymics did not differ significantly on their MPI E scale scores. This immediately suggests that either hysterics and dysthymics might not be appropriate criterion groups for extraversion and introversion respectively or that the MPI E scale does not measure what was originally intended, or that both statements are true. (This notion was reiterated and developed further by Sigal, Star and Franks; 1958, who severely criticized 'the use of hysterics and dysthymics as criterion groups'.)

#### A Brief Look at R.B. Cattell

As early as the 1930's Cattell (1933, 1936) had considered the concept of 'introversion', not as a unitary dimension but as a





compound involving two bipolar factors: surgency and adjustment. Cattell, however, remained very skeptical about the concept of extraversion and insisted that it was nothing more than a broad cluster of related trait elements, and, as such, was not a very useful construct (1946)<sup>9</sup>. Later, Cattell would alter this position with the 'discovery' of 'second-order' factors in the questionnaire realm (1956). The development of Cattell's 'system' of primary source traits, from rating studies (Cattell, 1945; 1947) to questionnaire 'factors' (Cattell, 1950) which had been 'targeted' to the 12 (A to L) rating 'factors', is described in detail in Howarth and Browne (1971a).

Having 'discovered' 'second-order' factors, one of which he called 'exvia', arising from factoring the intercorrelations between the oblique 'primary factors'<sup>10</sup> in the questionnaire realm (Cattell, 1956), Cattell had now come to suggest that "...it is perhaps worthwhile to make a determined attempt to rescue the label 'extravert-introvert' from the scientific disrepute and uselessness into which it has fallen through popular adoption" (Cattell, 1957, p. 267).

...The same correlation of primary factors,  
and their second-order analysis,...yield,  
also evidence of some general influence which

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9. Time and future multivariate research may prove Cattell to be correct on this point.

10. In the previous discussion of Guilford, I indicated the early beginning of the development and use of Thurstone's simple structure assumptions, however whereas Guilford has, in general, rotated orthogonally (not in all cases, admittedly) and continues to advocate this method, Cattell has consistently advocated oblique solutions as offering the 'best simple structure'. These can lead to second and third order 'factors' in the opinion of some writers.





simultaneously connects with liking for people in the sense of affectothymia (A), with talkativeness and cheery optimism in surgency (F), with adventuresome boldness of parmia (H), and with a tendency to live with the group as opposed to self-sufficiency and individualism (Q2). This second-order extraversion-introversion source trait also has some correlation with dominance (E), and of freedom from paranoid suspicion (L) (Cattell, 1965, p. 123).

With Cattell, the appearance of multidimensionality had returned to the extraversion-introversion concept, providing, despite Cattell's poor primary scales (Howarth and Browne, 1971a), possibly the first real progress in this search for a genuine 'Prior Multivariate Operational Definition' (Howarth, in Dreger, 1972) of this much discussed personality dimension, since Guilford in the 1930's. This secondary 'factor picture' of Cattell should however be regarded as provisional, in view of Cattell's extremely questionable identification of his primary 'factors' arising from the questionnaire media (Howarth and Browne, 1971a; Howarth, Browne, and Marceau, 1971).

The role of 'second-order' and 'higher-order' constructs, at this time, began to occupy an increasingly important role in the extraversion 'dimension' but it should be pointed out that the 'notion' of extraversion as a 'second-order' factor was not new. Eysenck had, in fact, suggested some years before (Eysenck, 1953) that:

Emphasis on this correlation between primary factors may seem to many to be labouring the obvious...as we have seen, these clusters of responses are really far from independent, and it is precisely on their intercorrelations that such higher order concepts as introversion-extraversion are built up (p. 105).



That, Eysenck did not heed his own notions in constructing his Maudsley Personality Inventory, demonstrates his precarious approach to the assessment of the extraversion-introversion concept in the questionnaire realm. The reader is well advised to observe Eysenck's notions of the questionnaire assessment of extraversion-introversion, closely, as this review proceeds.

An excellent example of the appearance of extraversion and introversion as 'second-order' factors is provided in a joint analysis of the intercorrelations of Guilford and Cattell primary scales by Mann (1958). Within his analysis, Mann obtained a factor (III) which he interpreted as 'Social Extroversion' which had loadings from Guilford's S (Sociability), G (General activity), and A (Ascendance), and Cattell's H (Parmia) and E (Dominance) scales. Factor IV had loadings from Guilford's R (Restraint) and T (Thoughtfulness), and Cattell's F (Surgency)<sup>11</sup>. Mann suggested that:

Factor III corresponds to the American conception of extroversion, with its emphasis on sociability and ease in interpersonal relations, while Factor IV corresponds to the European conception of extroversion, with its emphasis on impulsiveness and weak super-ego controls (p. 108).

Mann's suggestions, which were featured in Carrigan's (1960) 'reappraisal of extraversion and introversion as dimensions of personality', would later serve to move Eysenck to hypothesize the 'dual nature of extraversion' (Eysenck and Eysenck, 1963). (As we have remarked, Corcoran's work inspired Eysenck's article on the 'unitary

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11. The scales were from Guilford's GZTS, and Cattell's 16 PF.



nature of extraversion').

### Reappraisals, Criticisms and 'New' Scales.

The central issues in an excellent, and often quoted, review article by Carrigan (1960) were: (1) is extraversion-introversion a unitary dimension of personality? (2) is extraversion independent of adjustment? Carrigan's article succinctly summarizes most of the critical work from 1953 to 1959<sup>12</sup> by means of ratings, questionnaires and objective tests. Carrigan concluded her review by suggesting that:

...more recent research has shown the evidence on both issues to be equivocal, and the status of extroversion-introversion as a dimension of personality thus remains somewhat tenuous.

In the meantime, a word of caution seems in order. If the term extraversion-introversion is to continue in psychological usage - and, judging from past history, there is little likelihood it will not - care must be taken to specify its conceptual and operational referent. What appear to be minor distinctions between the various conceptions may in fact be crucial ones; to discard them too hastily is likely only to propagate the illusion of a unity not yet established (p. 357).

Subsequently to Carrigan's article, Foulds (1961) considered that the only appropriate criterion groups for the study of extraversion and introversion were normal extraverts and introverts, rather than abnormal groups such as hysterics and dysthymics. Thus Foulds was criticizing Eysenck's early identification of extraversion with hysteria and introversion with dysthymia, and by inference, previous

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12. For a review of work prior to 1953, see Eysenck (1953).





attempts to establish questionnaires along similar lines (e.g., Heron; 1956). Before this could be done, however, a valid measure of extraversion was necessary.

....it is argued that any attempt to validate the MPI E Scale by demonstrating differences between hysterics and dysthymics is logically indefensible. All that can be demonstrated by such means are additional characteristics of hysterics and dysthymics. Within this framework much of Eysenck's work may be of value; but it is important to stress that nothing at all has been proved to have been said about introversion and extraversion, since the introduction of these concepts involves a shift of universes of discourse resulting from logically unsound deductions from Jung's untested hypothesis (p. 387).

#### The Important Work of A.W. Bendig.

Bendig (1962a) felt that it was essential to clarify the differences in factor names used by Guilford and Eysenck, and he suggested that Eysenck might be dealing with broader factors than those considered by Guilford and these may correspond to the second-order factors found in the factor analyses of Guilford's GZTS (e.g., Bendig, 1960). "If so we would expect that the MPI Extraversion scale would load on the same factor as the GZTS R and T scales..." (p.22).

To test this supposition, Bendig therefore carried out a joint factor analysis on the 10 GZTS and the 2 MPI scales. The 12 scores were obtained from 160 male college students, intercorrelated (product-moment), factored (complete centroid method), and the first 5 factors retained, for transformation to oblique simple structure (using the analytic criterion of Pinzka and Saunders, 1954). Four



interpretable factors resulted: Extraversion-introversion (EI), Emotionality (Em), Social Activity (SA), and Friendliness (Fr). The major finding in the analysis was that the MPI E scale did not show any appreciable loading on the GZTS R scale (from which it was designed) but rather appeared as a measure of the GZTS Social Activity factor. Bendig concluded that "...because of the pool of items used by Eysenck in constructing the MPI Extraversion scale this scale does not measure the factor it was originally intended to measure" (p. 26).

Bendig's results are somewhat similar to those reported earlier by Jensen (1958), and thereby bring two critical issues to our attention: (1) Eysenck's expectations of constructing a measure of 'extraversion' with a de-emphasis on sociability had not yet been attained, and (2) the importance of establishing adequate item pools prior to developing a questionnaire instrument. The second point is, of course, highly relevant to the present research and to my general thesis.

In pursuing the issue, Bendig (1926b) mentioned a third critical point. "It is instructive to note that the MPI scales were not derived through factor analysis, but items were selected through item analysis and factor validated by an ex post facto factor analysis of the already selected 48 items" (p. 201).

Subsequently Bendig (1926b) sought to accommodate these issues by developing reliable and factorially valid scales measuring 'Social Extraversion-Introversion' (SEI) and 'Emotionality' (Em). The author prepared an item pool of 158 items selected from the GZTS, MPI, Taylor's Manifest Anxiety Scale, and Drake's MMPI Social



Introversion Scale. Additionally, 115 items from several experimental and need achievement scales were included as 'buffers' and not used in the analysis. Analysis of the items was carried out in two parts - one suspects that this was adopted due to an upper limit placed on the number of variables that existing computer facilities would handle - : the first part consisted of intercorrelating phi coefficients between the 118 items selected from the MPI, MAS, and MMPI Si scales administered to 150 male and 150 female students. The correlation matrix was then factored by the method of Principal Components<sup>13</sup> (unities in the principal diagonal). The first 2 factors extracted were then rotated to orthogonal simple structure using Varimax (Kaiser, 1958)<sup>13</sup>. The 25 items with the largest variance attributable to the 'Social Extraversion-Introversion' (SEI) factor and with the smallest variance on the 'Emotionality' (Em) factor were selected for further analysis along with the 25 items with the largest variance on Em and the smallest on SEI. The items so obtained were then combined, in the second part of the analysis, with 40 items from the GZTS and a similar analysis performed using the responses of an additional 150 male and 150 female students. Two factors were again obtained with 30 items showing high loadings on SEI,

13. This method is the most widely used at the present time and has been found to be of greater value than the older centroid method (e.g., as used in the majority of Eysenck's and Cattell's earlier studies). Both Cattell and Eysenck have now adopted Principal Components factoring. In addition analytic rotation by Kaiser's Varimax is the most popular current rotation method, and despite attempts to replace this method (e.g., alpha-binormamin) there is yet no better generally useful method (Kaiser, 1971). Other methods, e.g., Joreskog (1967) have not been dimensioned to handle more than 50 or so variables. Similarly, the alpha method can handle only very small data matrices.





and 30 items with high loadings on Em. These 60 items comprised the final form of the inventory, called the Pittsburgh Scales of Social Extraversion-Introversion and Emotionality (PSEI). The item-content of the inventory is reproduced below.

It should be noted that these Pittsburgh SEI and Em scales are the only measures of the second-order "extraversion" and "emotionality" factors, with the exception of scales developed by Cattell, that were constructed by selecting items by factor analytic procedures (p. 207).

Bendig's work, comprising extended item pools and item-factor-analysis is representative of the progressive methodological approach to this critical psychometric problem of 'extraversion'. His work represents an advance over Guilford's earlier brilliant work in that he conceptualized the need for adequate and valid measures based on less restricted item pools, and moved continuously in the pursuit of finding the solutions with item-factoring and up-dated rotational techniques. If a criticism can be made of Bendig it is with respect to his conceptualization of his two rotated orthogonal primaries as being 'equivalent' to 'second-order' factors. In more contemporary terms his primaries resemble our 'Sociability' (SY) and 'Adjustment-Emotionality' (AE) factors and thus his Pittsburgh Scales are really measures of only two replicable primary factors. It is with some sorrow that I remind the reader that Arthur Bendig cannot now defend himself on these issues with which he would undoubtedly be concerned<sup>14</sup>.

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14. A.W. Bendig passed away in 1963.





*Social Extraversion-Introversion Scale*

1. I am happiest when I get involved in some project that calls for rapid action. (E-1)
2. I usually take the initiative in making new friends. (E-4)
3. I would rate myself as a lively individual. (E-8)
4. I would be very unhappy if I were prevented from making numerous social contacts. (E-9)
- 5.\* I am inclined to keep in the background on social occasions. (E-14)
6. I like to mix socially with people. (E-20)
- 7.\* I am inclined to limit my acquaintances to a select few. (E-22)
8. I like to have many social engagements. (E-26)
9. I generally prefer to take the lead in group activities. (E-28)
10. I nearly always have a "ready answer" for remarks directed at me. (E-32)
11. I would rate myself as a happy-go-lucky individual. (E-34)
- 12.\* I am inclined to keep quiet when out in a social group. (E-36)
13. I can usually let myself go and have a hilariously good time at a gay party. (E-38)
14. Other people regard me as a lively individual. (E-44)
15. I would rate myself as a talkative individual. (E-46)
16. I am a good mixer. (M-57)
17. I like to go to parties and other affairs where there is lots of loud fun. (M-99)
18. I like to flirt. (M-208)
19. I should like to belong to several clubs or lodges. (M-229)
- 20.\* At parties I am more likely to sit by myself or with just one other person than to join in with the crowd. (M-377)
21. I love to go to dances. (M-391)
22. I enjoy social gatherings just to be with people. (M-449)
23. I enjoy the excitement of a crowd. (M-450)
24. My worries seem to disappear when I get into a crowd of lively friends. (M-451)
25. I like parties and socials. (M-547)
26. I am a carefree individual. (G-32)
27. I make decisions on the spur of the moment. (G-67)
28. I like wild enthusiasm, sometimes to a point bordering on rowdiness, at a football or baseball game. (G-117)
29. I generally feel as though I haven't a care in the world. (G-132)
30. I usually say what I feel like saying at the moment. (G-137)

*Emotionality Scale*

1. I am sometimes happy, sometimes depressed, without any apparent reason. (E-2)
2. I am frequently "lost in thought" even when supposed to be taking part in a conversation. (E-6)
3. I am inclined to be moody. (E-10)
4. I have frequent ups and downs in mood, either with or without apparent cause. (E-11)
5. I am inclined to ponder over my past. (E-15)
6. I sometimes feel "just miserable" for no good reason at all. (E-17)
7. I often find that I have made up my mind too late. (E-19)
8. I would rate myself as a tense or "high strung" individual. (E-27)
9. I often experience periods of loneliness. (E-29)
10. I like to indulge in a reverie (daydreaming). (E-31)
11. I have often felt listless and tired for no good reason. (E-35)
12. I have sometimes been bothered by having a useless thought come into my mind repeatedly. (E-41)
13. I work under a great deal of tension. (T-13)
14. I find it hard to keep my mind on a task or job. (T-32)
15. I certainly feel useless at times. (T-142)
16. I frequently find myself worrying about something. (T-217)
17. I have periods of such great restlessness that I cannot sit long in a chair. (T-238)
18. I am more sensitive than most other people. (T-317)
19. I have sometimes felt that difficulties were piling up so high that I could not overcome them. (T-397)
- 20.\* I am usually calm and not easily upset. (T-407)
21. At times I think I am no good at all. (T-418)
22. I worry quite a bit over possible misfortunes. (T-431)
23. I sometimes feel that I am about to go to pieces. (T-555)
24. I sometimes find myself "crossing bridges before I come to them." (G-107)
25. I am philosophically inclined, that is, inclined to philosophize about things. (G-188)
26. I often take time out just to meditate about things. (G-218)
27. I try to sense what people are thinking about as they talk to me. (G-238)
28. I frequently find myself in a meditative state. (G-268)
29. I often watch others to see what effects my words or actions have upon them. (G-273)
30. I am inclined to be introspective, that is, to analyze myself. (G-278)

\* Items scored for false response.



A Return to Eysenck: the EPI; the Dual Nature of Extraversion, and the Unitary Nature of Extraversion.

In the face of mounting criticism on his identification of hysteria and dysthymia with extraversion and introversion (Sigal, Star and Franks, 1958; Foulds, 1961); with the MPI E scale being reported not to be a measure of 'extraversion' but rather a measure of sociability (Jensen, 1958; Bendig, 1962a), and with reports that the items on the MPI E and N scales show overlap and sometimes considerable correlation (Jensen, 1958; McGuire, Mowbray, and Vallance, 1963; Caine and Hope, 1964), Eysenck subsequently attempted to overcome the criticisms with the development of the Eysenck Personality Inventory (EPI; Eysenck and Eysenck, 1964). "For the purpose of constructing the EPI, about a dozen further factor analytic studies were carried out, one of which resulted in a matrix of 128 entries, which included all the items in forms A and B, as well as a set of substitute items" (p. 10). In addition to the 24 E and 24 N items selected for the final questionnaire a 9 item 'Lie' (L) scale was incorporated from items obtained from the MMPI 'L' scale. The authors reported that the selection of items had served to reduce the correlations between the E and N scales that had been found with the MPI (See references above). In a similar manner to that of Bendig, Eysenck stressed the importance of item-factor-analysis. "It is believed that this is the only Inventory in existence which has included only questions, all of which formed part of one single factor analysis; there are reasons for treating with considerable caution claims for inventories built up on a more piecemeal fashion"



(p. 10). Eysenck refined these comments in a later book (Eysenck and Eysenck, 1969) particularly in reference to the work of Cattell.

We must ask ourselves, once again, what is the nature of extraversion? Following the lead suggested by Mann (1958) and stirred by Carrigan's review (1960), the Eysencks examined the concept of extraversion further (Eysenck and Eysenck, 1963). The authors assembled 66 'extraversion', 'neuroticism', and 'lie' scale items (the item sources are not given), and administered them to a 'mixed population' of 133 males and 167 females. The correlation matrix was then factored by the method of Principal Components and four factors extracted. "These were then rotated, retaining orthogonality, into a close approximation to Thurstone's simple structure solution, graphical methods being used..." (p. 47). The primary, orthogonal factors obtained were identified as (I) 'Extraversion', (II) 'Neuroticism', (III) 'Impulsiveness', and (IV) a doublet (i.e., two loadings) called 'Jocularly'. An examination of the item content of these factors reveals that they are, quite probably, sociability, adjustment-emotionality, impulsivity, and jocularity respectively. What is striking about these results is that, in spite of his own hypothesis that the concept of 'extraversion' can only be found by factoring the intercorrelations between the primaries (see Eysenck, 1953, p. 105), Eysenck here is suggesting that 'extraversion' exists at the primary factor level! The authors, at this time, then conceded that 'extraversion' was a personality dimension of a 'dual nature': sociability and impulsiveness.

The plot thickens. Eysenck was impressed with the results obtained





by Corcoran (1964) with the 'lemon drop test' and initiated his own study to factorially determine the reported findings (Eysenck and Eysenck, 1967). The authors utilized Form A of the EPI containing 57 questions and used, in addition, as the 58th variable, scores of 45 males and 48 females on the 'lemon drop test'.

The scores of the 93 S's on the lemon test and the 57 questions of the EPI were intercorrelated, and the resulting 58x58 matrix of product-moment correlations factor-analyzed by means of the principal components method, and rotated by means of Promax...The first factor to emerge was clearly identifiable as extraversion, the second as neuroticism (p. 385)<sup>15</sup>.

With a .74 loading of the 'lemon test' variable on the first factor Eysenck claimed to have found the 'unitary nature of extraversion'. On the first factor 'clearly identifiable as extraversion', taking only those loadings greater or equal to .40<sup>16</sup>, we find 10 sociability items, 4 impulsivity items, and 1 jocularity item. Promax has clearly not done the job of separating these items and in fact has 'piled' the variance into the first two factors, making such a separation impossible. What Eysenck is interpreting as 'extraversion' is a statistical artifact due to inadequate rotation. Nevertheless, Eysenck is now claiming 'extraversion' to be a factor, of, primarily,

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15. Promax is an oblique analytical transformation program put together by Hendrickson and White (1964).

16. Results in our own laboratory suggest that (1) with 4th powered Promax the very smallest loading acceptable on the first factor, at least, is .40 (2) 4th powered Promax has a tendency not to adequately distribute the variance on the first two or three 'primaries' with the result that the factors obtained either look like 'quasi-second-order' factors, or are not interpretable.



sociability, at the first order level.

Five years after the development of the Eysenck Personality Inventory, Eysenck reported on its item factor structure (Eysenck and Eysenck, 1969). Eysenck submitted 108 EPI items to a Principal Components analysis, using the responses of 500 subjects "... half males and half females; these differed widely in age, education and social class, although the better educated and the middle class were over-represented to an extent which would make it impossible to consider this as a random sample of the population" (p. 155). Following factor extraction and rotation 14 Varimax and 22 Promax factors were obtained, which, for comparison, are reproduced below. Numbers in brackets indicate the number of significant items (salients) loading on that factor.

<u>Varimax (Orthogonal)</u>		<u>Promax (Oblique)</u>	
1.	Mood-swings (7)	Mood-swings	(16)
2.	Sociability (6)	Sociability	(11)
3.	Jocularity (4)	Jocularity	(4)
4.	Impulsiveness (6)	Impulsiveness	(7)
5.	Sleeplessness (3)	Sleeplessness	(4)
6.	Inferiority (3)	Inferiority	(4)
7.	Quick-wittedness (4)	Quick-wittedness	(7)
8.	Liveliness (4)	Liveliness	(4)
9.	Nervousness (3)	Nervousness	(4)
10.	Irritability (4)	Irritability	(5)
11.	Psychosomatic (4)	Psychosomatic	(3)
12.	Masculinity (2)	Masculinity	(8)



<u>Varimax (Orthogonal)</u>	<u>Promax (Oblique)</u>
13. Uninterpreted (1)	Day-dreams (6)
14. Sensitivity (4)	Sensitivity (6)

Thus, with the exception of the number of significant loadings, the first 14 factors are almost identical for both the Varimax and Promax solutions. The authors play down the Varimax solution because of the a priori convention of the program to impose orthogonality on the solution and thus "The existence of all-embracing factors such as E and N is rendered impossible by the same token" (p. 165). On the other hand, the Promax solution "...while still maximizing simple structure imposes no a priori conception upon the factors and allows them to become oblique" (p. 165). The 'obliquity' between the primaries allows one to continue into 'higher-order' analyses. At the third order four factors were obtained: (1) Neuroticism, (2) Sociability, (3) Excitement, and (4) Joculariry. The item content of the sociability and joculariry factors in the third order solution, with the exception of 3 sociability items, are identical to the sociability and joculariry factors obtained by the Varimax solution. (This point will be more completely elaborated in the discussion). Eysenck now refers to 'extraversion', as a composite of sociability and joculariry, a 'Superfactor'. The authors' however neglected to state the angles between the primaries that allowed the higher-order analyses to be done with the eventuality





of obtaining 'Super Factors',<sup>17</sup>.

Our results enable us to give an answer to the questions raised by Carrigan (1960). There are not two types of extraversion - sociability and impulsiveness - but merely one, made up of both sociability and impulsiveness, as well as jocularity, liveliness, quick-wittedness, optimism, easy-going, etc. In this our present study agrees well with a previous one (Eysenck and Eysenck, 1963). As regards the relation between extraversion and adjustment we find complete independence. This is shown both by the unrotated principal components solution and by the Promax analytically-rotated oblique solution; the correlation between N and E in the latter, although statistically free to assume any value at all, turned out to be -0.05. On both these points, therefore, the results bear out Eysenck's (1947) original contentions (p. 167).

After 22 years of wandering, the 'cows have come home'. The following brief resume will serve to sum up Eysenck's factorial identification of 'extraversion' at the questionnaire level.

1944, Centroid Method, no rotation, 1st order, 2nd factor obtained, identified as Hysteria-Dysthymia.

1963, Principal Components, orthogonal graphical rotation, 1st order, 1st and 3rd factors, Sociability and Impulsivity.

1967, Principal Components, oblique Promax rotation, 1st order, 1st factor obtained, Sociability.

1969, Principal Components, oblique Promax rotation, 3rd order, 2nd and 4th factors, Sociability and Jocularity.

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17. At a recent visit to Eysenck's laboratory (April 1971) this question was posed to Eysenck by this writer with the answer that 'there wasn't room to reproduce the angles between the primaries in the text'. The fact is that while large tables were included, the vital small intercorrelation matrices were omitted. Without these the reader is unable to judge the acceptability of Eysenck's position, or to factorize (second-order) the matrices. Dr. Howarth (personal communication) has applied a Joreskog (1967) to the angles between the primaries in our own Promax solution of the EPI analysis with most interesting results.





With his most recent work Eysenck had finally heeded his own advice:

...such factors as emotionality and extraversion-introversion. If these exist they can be derived only from the observed intercorrelations between the primary traits (Eysenck and Eysenck, 1969, p. 32).

Despite its many ambiguities and shortcomings, Eysenck's most recent study (i.e., Eysenck and Eysenck, 1969) did have the immense value of pointing up the multi-factor nature inherent in the restricted pools of items that had been used to assess what was long termed 'extraversion'. As 'Super Factors', 'Extraversion' and 'Neuroticism' would seem to be very general, global terms, that describe that part of the 'personality sphere' assessable by questionnaire measurement. If, with the growing knowledge of the multivariate nature of 'extraversion', we nevertheless persistently appeal to the use of a global term to describe the individual's personality, (as does Eysenck) we have not progressed far beyond the assumptions of the pre-metric era (Chapter One).

With the increasing emergence of replicable primary factors such as sociability, adjustment-emotionality, impulsiveness, etc., a multivariate personality factor structure is beginning to appear within the gross 'dimension' once simply referred to as 'extraversion'. The descriptive utility of the term, as a personality dimension, would seem to be waning. We are in fact beginning to see that this over-used term, is in reality, a combination or glossing over of fine



identifiable trait dimensions.

#### Old Scales for a New Inventory.

Based primarily upon the Minnesota T-S-E Inventory (Evans and McConnell, 1941) and the Minnesota Multiphasic Personality Inventory, along with several 'exploratory' scales not found in any existing inventories at that time, Heist and Yonge (1968) developed Form F of the Omnibus Personality Inventory (OPI). Five of the 14 scales of this inventory appear to be putative extraversion measures. In this connection it should be pointed out that the Social Extraversion (SE) and the Thinking Introversion (TI) scales of the OPI are extended versions of the scales from the T-S-E inventory, and, in addition, other scales such as the Impulsive Expression (IE), Personal Integration (PI), and Altruism (Am) have all shown loadings on 'extraversion' factors in a factor analysis (Principal Components, unrotated and quartimax rotation) of the 14 scales (Heist and Yonge, 1968). It is of further interest to note that some relationship has been claimed between these putative scales, the Guilford-Zimmerman Temperament Survey scales, and the Sociability (SY), Social Presence (Sp), and Self-Acceptance (Sa) scales of the California Psychological Inventory (CPI; Gough, 1956).

#### A.L. Comrey; Factored Homogeneous Item Dimensions.

Variants of factor analytic methodology utilized for constructing scales and inventories or for assessing scales and inventories already constructed have included: (1) item-factor-analysis (Guilford, Bendig,



and Eysenck); (2) scale factoring (Flanagan, North, Bendig, and Heist and Yonge); (3) 'parcelling' factor analysis (Cattell); (4) A fourth variant introduced by Comrey (1961) and used in the construction of the Comrey Personality Scales (Comrey, 1970). Having described studies illustrating the first three methods we may now turn, for completeness, to the fourth method.

Comrey first described his method of Factored Homogeneous Item Dimensions (FHID's) in 1961. Beginning with an item-factor-analysis of pooled items those items loading greater than .40 on a particular factor were selected (usually 4 to 6 items) and comprised the FHID over which a total score is obtained. The total score on the FHID was then used as a single variable in a further analysis made up of scores representative of several FHID's. A factor arising from this further analysis is made up of a number of FHID scores that load upon it. Comrey suggested that such dimensions might provide more reliable measures and hence more stable factor results.

Comrey's method appears to be similar in many respects to the 'parcelling' method advocated by Cattell, but a subsequent attempt by Comrey to cluster Cattell's items into FHID's has met with failure, and a factor analysis of the FHID's which were obtained from Cattell's items did not reproduce the 16 PF system of factors at all well (Comrey and Duffy, 1968)<sup>18</sup>. In the same study a match was claimed between Eysenck's EPI N factor, Comrey's Neuroticism factor, and

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18. That Cattell's scales are factorially complex is further intimated by the 'acronyms' used to name them. This inherent factorial complexity of Cattell's scales will be increasingly evident later, and casts considerable doubt on his identification of 'exvia-invia' at the 'second-order' level.





Cattell's 'second-order' Anxiety factor. The EPI E factor and Comrey's Shyness factor were also claimed to match.

Extraversion-introversion was included as a factor in the recently developed Comrey Personality Scales. The E-I factor is composed of 5 FHID's: Lack of reserve, Lack of seclusiveness, No loss for words, Lack of shyness, and No stage fright, with four items comprising each FHID<sup>19</sup>.

#### An Independent Determination of the Item Factor Structure in the EPI.

In order to discover the factors actually measured by the EPI, Howarth and Browne (1971b) carried out an independent determination of its item factor structure. Sixty variables (Variables 1 to 57 were the successive items from the EPI; variables 58 and 59 were the subject's E and N scores respectively; variable 60 was sex) were intercorrelated using the responses of 666 male and 653 female undergraduate university students. The resulting correlation matrix was then factored by Principal Components and 15 factors extracted. The factors obtained were then rotated to orthogonal simple structure by means of Varimax. Interpretation of the factors is summarized below showing the factor, the number of salients, and the E and N loadings on the factor. The latter loadings are of great interest

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<sup>19</sup> This writer wishes to thank Professor A.L. Comrey for making unpublished information, with regards to the extraversion-introversion FHID's, available to him.

As opposed to two or three response alternatives, Comrey has used seven, in each of two categories, and one wonders whether he is going to assess traits or 'states'? These represent the most recent scales, to-date, as E-I measures.



in themselves as they serve to indicate the alignment of the factor structure to the conventional scales (as claimed by the test designer) and provided information concerning the 'orthogonality' of extraversion and neuroticism.

<u>Factor</u>	<u>Salients</u>	<u>E Loading</u>	<u>N Loading</u>
1. Sociability I	7	.60	-.11
2. Adjustment- Emotionality	7	-.13	.43
3. Inferiority	5	-.11	.42
4. Impulsivity	3	.42	.12
5. Mood Swings- Readjustment	4	-.07	.39
6. Sleep	5	.04	.37
7. Superego I	5	-.03	.37
8. Jocularly	3	.36	-.05
9. Sociability II	5	.32 <sup>20</sup>	.13
10. Dominance	4	.11	.14
11. Lie I	5	.05	.04
12. Social Conversation	3	.23	-.04
13. Hypochondriac- Medical	3	.05	.23
14. Superego II	3	-.11	.21
15. Lie II	5	-.05	.04

(Note: Loadings of scale scores on factors are shown, not the reverse)

20. Note that significant E and N loadings are observed only for the first 9 factors.



The factor structure obtained was, in general, similar to that reported by Eysenck and Eysenck (1969). Moreover, a reasonable separation was obtained in terms of the E and N scales: E was seen to be composed of two Sociability factors, plus Impulsiveness, Jocularly, and Social Conversation; N proved to be a mixture of Adjustment-Emotionality, Inferiority, Mood Swings-Readjustment, Sleep, Hypochondriac-Medical, and two Superego factors<sup>20</sup>. One area of disagreement with Eysenck is very pertinent, namely that E and N did not arise as 'orthogonal' scales. This is supported both by the observed loadings of the E and N scores on the factors obtained, and a correlation between the scales of  $-.12$  for the sample of 1319 students<sup>20a</sup>.

Since Eysenck argues that the primaries should be coalesced into higher-order factors, Howarth and Browne further obtained an oblique solution with Promax, the primary aim of which was to ascertain the inter-factor correlations between the primary factors. Five prominent, interpretable factors were found: Anxiety, Sociability, Superego, Dominance, and Impulsivity. Correlations between the factor pairs are shown below.

Anxiety-Sociability	.053
Anxiety-Superego	-.114
Sociability-Superego	.068
Anxiety-Dominance	.235
Sociability-Dominance	-.058
Anxiety-Impulsivity	-.019

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20. Note that significant E and N loadings are observed only for the first 9 factors.

20a. We have shown the loadings of Eysenck's E and N 'scales' on the 15 factors. The fact that these 'scales' are imperfect is shown by certain E items correlating higher with the N scale than their 'own' scale.



Superego-Dominance	.197
Sociability-Impulsivity	-.332
Superego-Impulsivity	-.406
Dominance-Impulsivity	-.214

With the exception of the Superego-Impulsivity and the Sociability-Impulsivity pairs, Promax (fourth power) still leaves the axes close to orthogonality, in the face of which evidence it is hard to accept Eysenck's argument for carrying out 'higher-order' solutions.

#### Overview and Implications for the Future.

We may ask: Where does this review leave us with respect to the search for 'Extraversion' as a personality dimension? The evidence assembled here supports a conclusion that the term 'extraversion' is commonly adopted for 'sociability'; this receives strong support going back to the early metric work by Freyð (1924) and appears in the early factoring of Guilford, and is now contained in the work of Eysenck and Cattell, and many others. However, multivariate analyses including the present results, show us that while sociability is a key component, it is only a single component in a factor structure of replicable primary traits.

Certain common threads which appear in the historical spectrum of the 'Extraversion' concept, are the descriptive phrases gleaned from the pre-metric era, followed by the 'item ideas' which have been adopted in innumerable scales and inventories.

The problems encountered in our discussion have not all been conceptual, many have been practical. Thus, selection of 'item ideas'





for any particular research or inventory have been sampled from highly restricted item pools. An excellent example of this is Eysenck's development of the MPI by taking a handful of unaltered Guilford items<sup>21</sup>.

In deference to the early workers it must, however, be stated that a severe handicap placed on their analytic capabilities was technology. Upper bounds on the number of variables that a single analysis could accommodate were dictated at each stage by current computer technology. However, as Eysenck has so aptly pointed out: "...for work done since 1955 or thereabouts it must be said that failure to extend the process of factor analysis right down to the fundamental building stones of any inventory or questionnaire form a severe weakness which could easily have been overcome" (Eysenck and Eysenck, 1969, p. 327). Moreover, within the last 15 years the feasibility of carrying out very large scale analyses has steadily increased, yet in the majority of instances this has not been pursued. Instead, as a kind of 'displacement mechanism' we have noted various kinds of inadequate 'scale analyses', 'parcelling', or 'Factored Homogeneous Item Dimensions', rather than the essential factoring of items as personality variables in large scale analyses.

My thesis is that individual items (as response variables) are the key to the determination of measurable dimensions of personality. As Eysenck (Eysenck and Eysenck, 1969) has stated: "The building stones of a questionnaire are the items, and objectivity demands that

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21. Why a wider and more comprehensive sampling of items was not done is a matter of conjecture.



factor analysis should begin at this level, i.e. with the inter-correlation and factor analysis of items" (p. 326). To measure these dimensions we clearly need comprehensive item pools, and the first indication that computer technology had made such an ambitious undertaking feasible, was the now-monumental work of Sells, Demaree, and Will (1968). Using as a basis the restricted domain of marker items submitted by Guilford and Cattell, the authors carried out a factor analysis of a 600x600 matrix comprised of 300 Guilford and 300 Cattell marker variables. A presentation of the results will be presented in the Discussion in comparison with the results of the present study. The authors' conclusions were that: "In the present (i.e., their) study, the correlations and the factored and rotated results, demonstrate beyond question, that analysis at the item level is highly destructive to the factors previously assembled<sup>22</sup> with inadequate concern for their loadings in large matrices in which a wide range of factors is known to exist" (p. 184). Their conclusion was supported by the first item-factor-analysis of Cattell's 16 PF (Howarth and Browne, 1971a).

Additional convincing evidence for the feasibility of very large scale item-factor-analysis was the study of the Adjective Check List (ACL) by Parker and Veldman (1969). In this instance a 300x300 matrix of ACL variables, intercorrelated with phi coefficients, was factored

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22. i.e., by Guilford and Cattell respectively. This thesis has benefitted enormously from personal discussions of their work with Guilford and Cattell. I have had intensive discussions with these distinguished scientists, both at their homes and here at the University of Alberta, and have thereby gained an indispensable knowledge regarding the current controversy.



by the method of Principal Components and 10 of the 20 factors obtained rotated by Varimax of which 7 were interpreted. The authors' labelled the fourth factor Introversion-Extraversion "because the content (8 salients greater than .40) seems uniformly clear" (p. 610). [The salient adjectives were : quiet, silent, talkative, outgoing, reserved, shy, loud, and timid i.e., again sociability].

#### Concluding Remarks.

With the need for a definitive determination of the item factor structure in a non-restricted marker item domain within the broad scope of what has been termed as 'Extraversion', and, in turn, with the necessary computational tools available, the Comprehensive Opinion Survey was conceived, and is the consideration to which we now turn.

The present study thus attempts to resolve several key issues:

- (1) Are primary personality factors obtainable by applying item-factor-analysis to a widely sampled item domain?
- (2) How do the factors thus obtained resemble previously discovered factors reported in the literature?
- (3) Are the factors invariant across sex?
- (4) Are the primary personality factors stable and replicable?
- (5) Can individual trait differences in personality be adequately described, for research and clinical applications, by finer categorization within the broad term 'EXTRAVERSION'?





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## PART II

## METHOD



## Orientation.

The preceding chapters have outlined the importance of comprehensive itemetric research in the personality domain. Turning now to the Method a number of considerations must be related in detail and, to this end, Part II is presented in two chapters. Chapter Three describes the development of the itemetric 'tool', the Comprehensive Opinion Survey. Development of the item pool, selection of items, formatting, balancing, construction of the questionnaire, distribution and subjects, and processing the returns are reported.

Chapter Four deals with the issues of correlating the items with phi coefficients, factoring with Principal Components, rotation to orthogonal simple structure, the criteria for determining the 'number of factors', and the interpretation of the resulting factors by means of the psychological meaningfulness inherent in the total item content aggregations.

Part II is presented with intentional detail so that future generations of researchers may be encouraged to replicate, extend, or constructively criticize the conceptual and methodological considerations put forth.

Very large scale item-factoring is in its infancy, and if the research herein described can, in some way, contribute to the developing understanding of item-factor-analysis of global item pools, and to the eventual construction of up-dated inventories including only those stable and replicable primary personality factors, it may be said to have succeeded.





## CHAPTER THREE

## THE COMPREHENSIVE OPINION SURVEY

The Item Pool.

The conceptual framework for the item pool was very straightforward. A survey of the literature was carried out beginning with the early formation of 'item ideas' put forth by Freyd (1924). Proceeding from here inventories and rating scales were obtained from the published reports in the early metric literature and the questionnaires in the psychometric period. With the specific orientation of selecting only those instruments that were either developed specifically for assessing E-I and its (often) related concept of adjustment, or which had been used prominently with scales to assess extraversion, a number of item-sources were amassed.

The original sources included: the Freyd List (Freyd, 1924); Laird's Personnel Inventory Schedule C-1 (Laird, 1925); Marston's Introversion-Extroversion Rating Scale (Marston, 1925); the Heidbreder List (Heidbreder, 1926); Neymann-Kohlstedt Diagnostic Test for Introversion-Extroversion (Neymann and Kohlstedt, 1929); Stagner and Pessin Diagnostic Inventory (Stagner and Pessin, 1934); The Personality Inventory (Bernreuter, 1934); Minnesota Multiphasic Personality Inventory (Hathaway and McKinley, 1943); Gray-Wheelwright Questionnaire (Gray and Wheelwright, 1946); Guilford Zimmerman Temperament Survey (Guilford and Zimmerman, 1949); California Psychological Inventory (Gough, 1956); Heron Scale (Heron, 1956); Maudsley Personality Inventory (Eysenck, 1956); Pittsburgh Scales of Social



Extraversion-Introversion and Emotionality (Bendig, 1962); Sixteen Personality Factor Questionnaire (Cattell and Eber, 1957-1968); Myers-Briggs Type Indicator, Form F (Myers, 1962); Eysenck Personality Inventory (Eysenck and Eysenck, 1964); PEN Scale (Eysenck, 1968); Omnibus Personality Inventory (Heist and Yonge, 1968); Edwards Personal Preference Schedule (Edwards, 1959); Marlowe-Crowne Social Desirability Scale (Crowne and Marlowe, 1960); Sensation Seeking Scale II (Zuckerman, Kolin, Price, and Zoob, 1964); Howarth Personality Questionnaire 2 (Howarth, 1970); Comrey Personality Scales (Comrey, 1970).

Following careful inspection of all these potential sources and considering the very large number of items, many identical or overlapping, and also the questionable nature of development of certain of the scales and inventories, it was decided to delete some of the sources prior to selecting the items. The deleted sources were: The Freyd List, Laird's Inventory, Marston's Rating Scale, Bernreuter's Inventory, Gray-Wheelwright Questionnaire, Myers-Briggs Type Indicator, Edwards Personal Preference Schedule, and the Marlowe-Crowne Social Desirability Scale.

Concentrating specifically on Extraversion and Adjustment items and scales, the remaining 19 inventories were broken down into items and scales that were scored for Extraversion and Adjustment. Each item selected was individually recorded on an index card in the manner below:



MPI - E - 14

Are you inclined to keep in the background on social occasions?

(In this example the source is the Maudsley Personality Inventory - Extraversion Scale - Item #14 )

This procedure resulted in 1726 card-indexed items which were represented by the following sources:

Heidbreder's List, 37 items  
 Neymann-Kohlstedt, 50 items  
 Stagner and Pessin, 52 items  
 Minnesota Multiphasic Personality Inventory,  
     Drake's Si scale, 70 items  
     Geidt and Downing Ex scale, 41 items  
 Guilford Zimmerman Temperament Survey, Factors S, T, R,  
     G, A, M, O, F, P, and E, 300 items  
 Heron's Sociability scale, 32 items  
 Maudsley Personality Inventory, E and N scales, 48 items  
 California Psychological Inventory, Sy scale, 36 items,  
     Sp scale, 48 items, Sa scale, 19 items  
 Pittsburgh SEI and Em Scales, SEI scale, 30 items  
     Em scale, 30 items  
 Eysenck Personality Inventory, E and N scales from both  
     forms A and B, 96 items  
 Sixteen Personality Factor Questionnaire, Factors, A, C,  
     E, F, H, I, L, M, N, O, Q2, Q3, Q4, Form A  
     151 items, Form B, 151 items, and Form C, 78 items  
 Omnibus Personality Inventory, 5 scales, TI, Am, IE, SE,  
     and PI, 233 items  
 PEN Inventory, E and N scales, 20 items  
 Comrey Personality Scales, 5 FHID's, Lack of Reserve, 4 items,  
     Lack of Seclusiveness, 4 items, No loss for Words,  
     4 items, Lack of Shyness, 4 items, and No Stage  
     Fright, 4 items.  
 Howarth Personality Questionnaire 2<sup>1</sup>, 150 items.

1. This is an unpublished questionnaire with 15 factor 'hypotheses' and 10 items per factor, derived as an extended version of the HPQ, a factor analysis of which is reported in Howarth and Browne (1971a).



Sensation Seeking Scale II<sup>2</sup>, 34 items.

Development of the Twenty Putative Factor Hypotheses.

Once the items had been selected from their sources and card-indexed the next task was to re-group the items depending on the item content and the scale or factor which the item originally represented. Sorting of the items into more homogeneous groupings resulted in 20 'Putative Factor Hypotheses' named according to the putative item content of the respective group.

1. Sociability (SY)	203 items
2. Mood Swings - Readjustment (MR)	85 items
3. Impulsivity (IP)	62 "
4. Sensation Seeking (SS)	69 "
5. Adjustment-Emotionality (AE)	56 "
6. General Activity (GA)	68 "
7. Thinking Introversion (TI)	159 "
8. Sex (SX)	44 "
9. Superego (SG)	80 "
10. Paranoia (PA)	92 "
11. Rhathymia (RA)	35 "
12. Hypochondriac-Medical (HM)	90 "
13. Ascendance (AD)	187 "
14. Social Conversation (SC)	25 "
15. Inferiority (IF)	28 "
16. Social Responsibility (SR)	25 "
17. Social Shyness (SH)	19 "
18. Group Tolerance (GT)	41 "
19. Persistence (PS)	19 "
20. Cooperativeness-Considerateness (CC)	12 "

Grouping of the putative items into the 20 putative factor hypotheses accounted for 1399 items with the remaining 327 not appearing to fit anywhere and which might conceivably have been used originally as

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2. A relationship between sensation seeking and 'extraversion' was reported by Farley and Farley (1967), a replication and verification was, in turn, carried out in our laboratory (Browne, Howarth, Skinner, and Wardell, 1970).





'buffers'.

Based on the item-groupings for putative factors (e.g., PS, CC) with the least number of items, it was decided to select 20 unique, non-overlapping items from each factor hypothesis to form the basis of the questionnaire<sup>3</sup>. This meant that, in spite of the large number of items available, additional putative items had to be invented. In all 31 items were invented and distributed throughout the 20 factor hypotheses: IP, 3; SS, 4; SX, 5; SR, 3; SH, 2; PS, 6; CC, 8.

The outcome of this item selection process was 20 putative factor hypotheses with 20 putative items per factor hypothesis.

The 400 items selected were represented by the following original sources.

1.	Heidbreder List	4
2.	Neymann-Kohlstedt	10
3.	Stagner and Pessin	5
4.	MMPI	21
5.	GZTS	79
6.	Heron Scale	10
7.	MPI	15
8.	CPI	12
9.	Pittsburgh SEI	2
10.	EPI, A	12
11.	B	11
12.	16 PF, A	37
13.	B	33
14.	C	21
15.	OPI	52
16.	PEN	2

3. Another very practical consideration was to design the selected number of variables for factor analysis in relation to the large computer program (MAXVAR) then under development. In addition, an important theoretical-practical consideration, was to avoid the factor solution being prejudiced by overinclusion of items from scales which had been popular in the older literature e.g. SY, TI, AD. These could overlay, and disguise, equally important primary factors.



17. Comrey Scales	12
18. HPQ2	25
19. Sensation Seeking II	6
20. Invented	31

#### Formatting and Balancing the 400 Putative Items.

Since the items represented such a variety of sources most had differing verbal structure which had been established for various reasons but depending principally upon the type of response format used. These had varied from a simple dichotomous 'Yes - No' to Cattell's complex of 'multiple' response alternatives<sup>4</sup>. All putative items that did not conform to either a first person 'I' or second person 'You' and could not be answered in a 'yes' (true) - 'No' (false) manner were re-written.

A second alteration to the items was balancing within each putative factor hypothesis. This was achieved by reversing the item content in 10 of each 20 putative items with the result of having 10 positive and 10 negative items within each putative factor. The notion of balancing items was based on the premise that balanced items within each putative factor hypothesis would be less susceptible to undesirable response sets.

#### The Dichotomous Response Format

The response format decided upon was a dichotomous 'Yes' - 'No'

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4. A closer examination of this, and its effect on Cattell's inventory, in particular its effect on frequency of use of the central (uncertain) category, is given in our item analysis of the 16 PF. (See Footnote 5 for comments relevant to this issue).



response alternative (forced choice). A number of reasons for using this format should be stated: (1) If an item is written clearly and in simple language it represents a straightforward stimulus to the subject. In turn the forced choice response presents a non-complex response to that particular stimulus. (2) If a complex item is written with a multiple choice response format the item itself is likely to become factorially complex (e.g., Cattell's 16 PF items). (3) It has been suggested that a dichotomous format serves to minimize the tendency to undesirable response sets (Eysenck, 1962). (4) It has been reported that dichotomous formats can be used with inventories previously constructed with trichotomous response formats, without lowering the reliabilities of the scales (Bendig, 1959a; 1959b). (5) Gilliland and Morgan (1931) found that when a trichotomous response format was used the majority of responses were placed in the central category. (6) A recent study of the 16 PF revealed the sensitivity of trichotomous scales<sup>5</sup> (Howarth, Browne and Marceau, 1971). (7) Use of the central

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5. Cattell's instructions to the test-taker request that there be a minimum of use of the central category thereby directing that subject to attempt a forced choice response. On the other hand, he suggests that "The forced choice is to be avoided because it produces a cumulative unwillingness to answer and lack of rapport" (Cattell and Cattell, 1969, p. 8). With less intelligent and less educated subjects the tendency to make more extreme responses "is eliminated in Forms E and F by allowing only two choices", however with "more adequately educated and disciplined subjects...three alternative answers to each item are provided...the forbidding of a middle category, frustrates the subjects' genuine attempts to give accurate answers, and may produce poor test morale..." (Cattell, Eber, and Tatsuoka, 1970, p. 23). Additionally, "...we believe that the forced choice, though it avoids some statistical difficulties, presents psychological difficulties in the form of evoking fatigue and opposition to the test procedure" (Delhees and Cattell, 1971, p. 155). These comments are completely contrary to our experience with the 16 PF both from the subjective verbal reports of subjects and our empirical work (Howarth and Browne, 1971b; Howarth, Browne and Marceau, 1971) using university students.





category in a trichotomous response format has been found to be a major salient loading on a personality factor (Howarth and Browne, 1971b). (8) An additional advantage in large scale work is the computational ease of using two alternatives. The phi coefficient is rapidly and accurately calculated by high speed digital computers. Unsubstantiated criticisms have been made with regard to the use of phi coefficients and these will be dealt with in some detail in Chapter Four.

#### Item-Order in the Questionnaire.

The items, in their final form, were then arranged so that each 20th item represented its putative factor in the questionnaire. As an example, the first putative factor hypothesis<sup>6</sup> was Sociability (SY); thus, Sociability items on the questionnaire were items 1, 21, 41, 61, 81, 101, 121, 141, 161, 181, 201, 221, 241, 261, 281, 301, 321, 341, 361, and 381. Within this ordering the positive and negative items were placed at random. The same procedure was carried out for the remaining 19 putative factors and their items.

#### The Questionnaire.

Once the items had been ordered the first 200 comprised Form A of the questionnaire, while items 201 to 400 became Form B. This was done to facilitate administration in order that testing could be

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6. Note that the ordering of the twenty putative factors was quite arbitrary except that factors which displayed some similarity, or which had been condensed in the literature (e.g., sociability and impulsiveness, also anxiety type factors) were kept separate in the ordering.



performed in two sessions. Anyone who has answered a questionnaire, of any kind, knows how boring it becomes if there are too many questions at one time.

With Form A and Form B now ready for the press, an additional safeguard against 'response runs' was determined upon. It was decided to alternate the 'Yes'-'No' response boxes on each successive page of the form. In this manner answers on page 1 were 'Yes'-'No', on page 2 'No'-'Yes', etc., throughout both forms of the questionnaire. Standard instructions to the test-taker were printed on the cover page of each questionnaire.

In line with the comprehensive item pool and coverage incorporated into the 20 putative factor hypotheses, the questionnaire was called the Comprehensive Opinion Survey (COS; see Appendix).

When the printing was completed one copy of Form A and one copy of Form B was placed in a manilla envelope and this then constituted one 'set' of 400 item-variables ready for distribution and administration. Each envelope was stamped for external identification (Subject's name, date, location, year of studies, age, sex, etc.,).

#### Distribution of the Questionnaire and Determination of the Final Subject Sample.

With 400 variables it was considered desirable to obtain a subject-to-variable ratio of 3 to 1 for statistical reasons. Toward this end letters were sent out to major universities across Canada requesting assistance in administering the questionnaires to a student population of at least 1200 subjects. Thirteen universities



assured us of a sample while 4 universities said they would 'try'.

One thousand and six hundred sets of COS were distributed amongst the 13 universities that had assured us of obtaining a sample. Standard instructions for the test administrators were included with each batch (See Appendix).

Seven months were allowed for completion of the testing and return of the tests for processing (October 1970 to April 1971 incl.).

Upon the eventual return of completed batches each test was individually scanned for the non-completed items, uncompleted pages, and comments that might indicate any unwillingness on the part of the subject to respond honestly and in a straightforward manner to the test items. The criterion adopted was to reject any test with such comments, and any test with more than 2% of non-completed items.<sup>6a</sup> Using this stringent criterion, 597 tests were rejected leaving 1003 complete data sets for processing. Obviously the number of subjects desired had fallen short, however 1003 was still considered 'healthy' statistically, and we preferred fewer genuine and complete data sets as the basis for data analysis.

The basic data, therefore, consisted of 1003 undergraduate university students participating from 13 universities across Canada. This sample was comprised of 488 females and 515 males, and the distribution over universities is shown below.

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6a. In the case of tests with up to 2% of non-completed items 'ones' and 'zeros' were inserted, at random, as 'responses' to these items.





<u>UNIVERSITY</u> <sup>7</sup>	<u>FEMALES</u>	<u>MALES</u>
University of Victoria (B.C.)	33	50
University of Saskatchewan (Saskatoon)	34	28
University of Saskatchewan (Regina)	44	97
Brandon University (Man.)	11	5
University of Winnipeg (Man.)	69	74
Laurentian University (Ont.)*	50	48
Trent University (Ont.)	9	5
Waterloo Lutheran University (Ont.)	51	75
Carleton University (Ont.)	36	20
University of Ottawa (Ont.)*	26	37
Sir. Geo. Williams University (Que.)	15	8
Dalhousie University (N.S.)	34	23
University of Prince Edward Island	76	45
	488	515

\*Bilingual - English-French.

#### Data Processing.

The 488 female and 515 male data sets were then punched separately onto standard IBM data cards.

Variables to be analyzed were the consecutive 400 items with sex (Male/Female) as the 401st variable. Values assigned to the 401 dichotomous variables were: 'Yes'=1, 'No'=0, Male=1, and Female=0. Six data cards were required for each subject.

When the data punching was completed the 2928 female data cards and the 3090 male data cards were then transcribed onto separate files of a data tape using a FORTRAN Cards-to-tape program. In this form the data was ready for analysis and it is to this that we now turn.

7. Note that our own institution was not included. The reason for this was that having carried out several item-factor-analyses at the University of Alberta (e.g., EPI, IPF, HPQ, HPQ2 studies) we wished to independently examine the replicability of the factors previously found.





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## CHAPTER FOUR

## COMPUTATIONAL METHODOLOGY:

## CORRELATION, FACTOR ANALYSIS, ROTATION

When the present study was first conceived, a major methodological drawback existed; namely lack of a suitable computational 'package' for carrying out correlation, principal components and rotation on 401 variables. The majority of existing programs were pressed to their limit entertaining 100 variables<sup>1</sup> and even with this size of data matrix required a great deal of time. Potentially suitable programs for correlation, principal components, and rotation had to be obtained, taken apart, re-dimensioned, reassembled, tested, and altered. This procedure was carried out simultaneously with the development of the questionnaire by a team of highly competent factor-analysts, statisticians, programmers and systems analysts, spearheaded by Professor E. Howarth. After over two years (August, 1968-April, 1971) of continuous development and many hours of computer time<sup>2</sup>, the advanced 'MAXVAR' program used in this study became an

1. When this study was first envisaged, early in 1969, a package to handle up to 200 variables was under development because Professor Howarth needed to handle this many variables for his APT study (laboratory-experimental personality measures). This program was developed and first run on the HDQ (dream questionnaire) factor analysis of 162 variables early in 1969. Twelve months later the original version of MAXVAR had been developed and was first run on 400 (random numbers generated) variables in late 1970. A more advanced version was then prepared for the present study.
2. The University of Alberta Computing Center, operating an IBM 360/67 computer with 756K core capacity, did not institute a charging system for CPU time until April 1, 1971. This made the development of very large scale programs economically feasible and lent itself ideally to the successful completion of this study.





operational reality. 'MAXVAR' is capable of correlating, factoring, and rotating to orthogonal simple structure, up to 450 variables (Howarth, 1971; Howarth and Braun, 1971).

#### 'MAXVAR': Technical Description.

'MAXVAR' is presently divided into three independent component parts:

- (1) Correlation routine. Input = raw scores, output = correlation matrix based on Pearson's product-moment formula.
- (2) Factoring routine. Input = correlation matrix, output = principal axis factor matrix based on the Householder Ortega-Wilkinson algorithm.
- (3) Rotation routine. Input = principal axis, or other factor matrix, output = normalized Varimax rotated matrix, with columns re-ordered according to their variance contribution.

The total package requires three control cards to pass necessary information, such as title, parameters, and format of input data onto the programs. The programs are written in FORTRAN IV H, and are presently set up to operate under IBM OS release 19 on a Model 360/67 computer at the University of Alberta. 'MAXVAR' requires 500K of user available memory, and additionally, either disc or tape for storage of intermediate outputs.

With this computational background we will turn to the vital issues of correlation, factor analysis, and rotation.

#### Correlation.

"Co-relations or correlation of structure" is a phrase much used in biology and not least in that branch of it which refers to heredity, and the idea is even more



frequently present than the phrase: but I am not aware of any previous attempt to define it clearly, to trace its mode of action in detail, or to show how to measure its degrees (Galton, 1889, p. 135).

Correlation is probably the most common statistical mode in the behavioral sciences today. Of far greater importance is the fact that it is the very backbone and the starting point of most factor analyses. Although the conceptual framework for the use of 'co-relations' in psychology is historically traceable to Francis Galton, 'genius-at-large', who was raised in the spirit of Darwinism (being a cousin of Darwin), the theorems of correlation were for the first time, and almost exhaustively, discussed by Bravais, 125 years ago (Bravais, 1846). Many years later, what had become known as the 'Galton function' was extended and developed by Pearson (1896) into what is now commonly referred to as the 'Pearson product-moment correlation coefficient' (although in some sources the more correct designation Bravais-Pearson is used).

The coefficient of correlation utilized in the present study is the phi coefficient. Phi coefficients are product-moment correlations between two variables each scored in a point fashion, e.g., 0 and 1. For this reason it is often referred to as the 'fourfold point correlation'. When phi is used with point distributions it is numerically equivalent to the Pearson  $r$ . It can, however, be adapted to continuous distributions reduced to fourfold tables.

The use of phi coefficients in factor analysis has been criticized due to their sensitiveness to the unequal splits in the means of the dichotomous item-variables.



An example: 'Phi or contingency coefficients should not be trusted because the size of these coefficients depends on the degree to which the item deviates from 50% true and 50% false responses. Where the deviations are extreme the items may yield spurious 'difficulty factors' which can seriously complicate the problem of factor extraction and interpretation'.

This opinion has arisen in certain quarters involved in the design of intelligence tests where the answers are (a) right or wrong, and (b) can be graded in difficulty level - but we must ask: Is this comment substantiated in factor analyses involving personality variables? Let us now critically examine this notion of 'difficulty factors' arising from factoring phi coefficients, in order to show that an opinion of this kind is not universally transferable, and certainly not applicable to our work.

Burt (1940) factoring item correlations for the Binet tests obtained, among other factors, what he termed 'difficulty' factors which appeared to indicate the relative difficulty of items assigned to different ages. It was then suggested that perhaps some arbitrary characteristic of the data could produce factors which one was hard-pressed to interpret (Guilford, 1941). Ferguson (1941) determined that when the phi coefficient is used and the frequency distributions of the several items were unequally dichotomized, spurious factors might appear on factoring the correlation matrix.

These early notions gained some impetus and were reiterated in the literature. "Factorial studies of items must be examined for





the possibility that heterogeneity of items in difficulty has given rise to spurious factors" (Carroll, 1945, p. 19); "The phi coefficient ...should not be used unless some correction is made to avoid spurious factors due to splits of the dichotomized variables" (Fruchter, 1954, p. 201).

It has also been suggested that personality items, like intelligence and ability items, can, and do vary in difficulty (Hanley, 1962; Dempsey, 1965). The question remains, however; can it be demonstrated that these 'difficulty items' (more appropriately to be referred to as 'biassed' items, e.g., means greater than .80 and less than .20) lead to spurious factors that will be confused with psychologically meaningful personality factors?

Comrey and Levonian (1958) compared the results of factoring with three point coefficients, phi, phi-over-phi-max, and tetrachoric, using personality variables from the MMPI scales. The authors showed empirically that the phi coefficient, contrary to popular belief, was the preferred method in point correlation work where factor analysis was to follow. "...the number of significant centroid factors obtained is at least as great with phi-over-phi-max and the tetrachoric r as with phi. Hence, if spurious factors exist with factor analysis of phi coefficients, they may be no less evident with phi-over-phi-max or tetrachoric coefficients" (p. 753). They also stated that: "the phi coefficient is much better for factor analytic work than is generally believed" (p. 754).

Borgatta (1965) pointed out that, in his many years of experience in factoring data involving dichotomous variables, his findings had not supported the notion of difficulty factors. In his very comprehen-





sive analysis of the phi coefficient Borgatta, in summation, stated, "The analysis presented in this paper has been detailed in order to demonstrate (in a complex factorial situation) the stability of factorial structures with changing difficulties of items and the fact that no difficulty factors can be demonstrated to develop" (p. 336).

Many recent factor analytic studies using phi coefficients to intercorrelate personality item-variables (Eysenck and Eysenck, 1969; Howarth and Browne, 1971a; 1971b) have not indicated even a hint of 'difficulty' factors. The latter authors have adopted the practice of carefully observing variables with biased means (greater than .80 and less than .20) to determine if they might arise, or contribute to, the appearance of a factor not readily interpretable. To date no relationship has been found. It is maintained therefore, that until otherwise empirically shown, the phi coefficient is a useful and accurate coefficient of correlation when dichotomous personality variables are intercorrelated for the purpose of factor analysis.

#### Factor Analysis.

The factor model adopted for use in the present study was the Method of Principal Components, which, for many reasons can be considered the preferred method for factorial studies of this nature. It is interesting to note that the Method of Principal Components is the oldest factor model in existence dating back to Czuber's 'Theorie der Beobachtungsfehler' (1891) where he put forward the idea of resolving 'errors' into Komponenten which should be orthogonal. Pearson (1901), however, produced the first 'working' model which set



the pace for modern factor analytic developments eventuating in Hotelling's method (1933) and more modern methods based upon Householder and Sturm sequence algorithms.

The use of other than unities as values in the principal diagonal of the correlation matrix was introduced to eliminate specific factors by reducing the trait-variables to values which would represent the common factor variances only (Burt, 1966). These 'other values', known more generally as 'communalities', have caused more grief and upset in factor analysis than perhaps any other issue. Rather than factoring correlation matrices (R), factor models utilizing communalities or communality estimates (e.g., squared multiple correlation) factored residual ( $R-U^2$ ) matrices where the value of  $U^2$  was unknown, and could never really be known, thereby introducing more unknowns into the picture.

It is, however, now a widely accepted view that factor analysis is concerned with the linear combination of actual variables (Nunnally, 1965). Nunnally has suggested that:

...if a factor loading is defined as the correlation of a standardized variable with a standardized linear combination of a set of variables, then to compute that loading from the correlation of sums, the formulas require that unities be placed in the diagonals of the correlation matrix. If anything other than unities are placed in the diagonal spaces, one is not correlating an actual variable with a linear combination of actual variables (p. 348).

An additional relevant notion is that for very large matrices the solutions are relatively insensitive to differences in the



communality estimates (Harman, 1960)<sup>3</sup>.

The use of unities in the principal diagonal can be very important in that:

...by placing unities in the diagonal and thus excluding 'unique' factors from the model, the resultant components...lie within the test space. That is to say, the components are linear composites of the scores on the observed variables (White, 1969, p. 195).

A further consideration making communality estimation, even if desirable an impracticality, is the fact that using these estimates usually demands iterative procedures, which are, of course, not feasible with matrices of the present size. To reiterate the original point: For various reasons Principal Components is the preferred method for the present study.

#### Rotation.

Rotation of the factor matrix to an approximation to orthogonal simple structure was done, analytically, using Varimax (Kaiser, 1958). Since both orthogonal rotation and oblique transformations are mathematically legitimate it really boils down to a matter of taste which is used. The 'advantages' of oblique transformations which some investigators (e.g. Cattell) advocate are mainly conceptual

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3. Even with small matrices this can be demonstrated, e.g., Skinner and Howarth (1971) compared three factor analytic methods on a 27 variable problem (IDL - individual differences in learning study) and found that the factor solutions were remarkably similar whether unities or SMC's were used as diagonal values. A letter from Sir Cyril Burt is quoted in that article supporting the finding from a mathematical-theoretical standpoint.





rather than mathematical in that they permit 'higher-order' analyses by factoring the inter-factor correlation matrices. Interest in 'higher-order' factors is directly related to any particular investigator's theory (e.g. Eysenck's 'Super Factor' theory).

Nunnally (1965) has a 'mild preference' for orthogonal rotations because "(1) they are so much simpler mathematically than oblique rotations and (2) there have been numerous demonstrations that the two approaches lead to essentially the same conclusions about the number and kinds of factors inherent in a particular matrix of correlations" (p. 327).

Results of several factor analyses carried out in our laboratory (Howarth Group for Personality Research), some of which have been previously mentioned, concur with Nunnally's opinion. In fact, to quote Dr. Howarth: "The oblique rotations I have used (Promax, Rotogram) have never proved so informative nor to be as clear as the orthogonal solutions".

Eysenck has also found this to be the case, and the reader is asked to refer back for a moment to Chapter Two (page 78) in order to view again the comparison of his Varimax and Promax (Hendrickson and White, 1964) solutions.

Under ideal circumstances (time, money, and persistence) a graphical transformation can be done by obtaining paired plots from the unrotated factor matrix, in order to have a visual impression of all hyperplanes in the data. Visual Rotogram plots can, in certain circumstances, enable the investigator to make more adequate judgments as to the nature of his data; in particular, the presence of



discernible hyperplanes enables the investigator to form more adequate judgements concerning the number of factors.

In the present study it was, however, simply impractical to attempt to plot 401 variables, as even with 187 variables (the 16 PF study) the plots become very cramped and 'obfuscated'. Experience, therefore recommends Rotogram for 100 variables or less. It should also be pointed out that Promax (analytical oblique method) is based on Varimax and was not attempted because it had never 'helped' in our previous work and was impractical for us to use.

In sum, the philosophy would seem to be that if your theoretical frame of reference demands higher-order analyses - go 'oblique'. If, however, you are investigating a marker domain with the aim of doing descriptive research on the major dimensions obtaining between the variables - 'orthogonality' is preferred, and analytic rotation by Varimax is the most expedient. As will be seen our entire emphasis is on the discovery of replicable primaries.

#### The Number of Factors.

The determination of the 'number of factors' for very large matrices is an issue which is presently controversial. The Kaiser-Guttman criterion of extracting factors until the eigenvalues (proportions of variance obtained as a function of the sum of the squared column loadings in the unrotated factor matrix) have reached unity (Guttman, 1954; Kaiser, 1961) is not functional for matrices of the present size. Their criterion is based on small matrices of about 50 variables where it includes factoring down to those accounting for



about 2% of the total variance. An alternative is the 'Scree' test described by Cattell (1966). Cattell's 'Scree' test, in general, indicates more factors than the Kaiser-Guttman on smaller matrices (e.g., 50 variables) but as the size of the matrix increases a reversal appears to take place and the Kaiser-Guttman indicates more factors than the 'Scree'.

With the criterion of obtaining only those factors which are meaningfully interpretable in terms of their total item content aggregations, the practice of statistical tests for the number of factors was not entertained. The arbitrary notions to stop extraction at a  $p < .05$  or  $p < .01$  level (McNemar, 1941; Burt, 1950; Rao, 1955; Lawley, 1956) is not a preferred practice in terms of 'meaningful interpretability'.

As a 'guide' the 'Scree' test was utilized for the separate male, female and combined analyses, and indicated the probability of 11 or 12 interpretable factors<sup>4</sup>. However, since the study was based on twenty putative factor hypotheses, it was deemed advisable to initially rotate all 20 factors in the male, female, and combined analyses to orthogonal simple structure. This initial factorization was carried out, additionally, as a safeguard in the event of underestimation by the 'Scree' (underfactoring is to be avoided; overfactoring is a safer procedure).

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4. Professor Howarth points out (personal communication) that in a series of marker studies, comprising six studies ranging from APT (50 variables) to IPF (187 variables) the 'Scree' test was more accurate in every case than the Kaiser-Guttman which began to grossly overestimate from 100 variables on up.



### Interpretation of a Factor

As is standard practice, interpretation of each factor was based on the psychological meaningfulness of the total item content aggregation within that factor. The determination of a significant item loading on a particular factor was based on what is perhaps a novel procedure. The procedure adopted was that of decreasing loadings as the variance contributions decreased with successive factors. In this manner, for the 20 factor solutions, a significant item on the first factor had to have a loading greater or equal to .400; factors 2 to 6 a loading greater or equal to .350; 7 to 11, .300; 12 to 20, .250. Similarly, for the 12 factor solution: factor 1 greater or equal to .400; 2 and 3, .350; 4 to 9, .300; 10 to 12, .250. A detailed consideration of the results will now be presented.





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### PART III

#### RESULTS



## CHAPTER FIVE

## ITEM FACTOR STRUCTURE OF THE COMPREHENSIVE OPINION SURVEY

The separate male, female, and combined solutions will be reported in two sections: the first section will deal with the 20 factor male, female, and combined analyses, the second with a more definitive 12 factor combined solution.

For the sake of comparing the male and female solutions with the combined solution, the male and female 20 factor solutions were targetted to the combined 20 factor solution in the first analyses. This 'matching' was not carried out as a statistical exercise but rather was an alignment of the item content arising in the male and female factors with the item content of the factors in the combined solution. The efficacy of this procedure allows an instant picture of the item-loadings across the male, female and combined solutions, and serves to spot any sex differences if they arise.

The 20 Factor, Male, Female, and Combined Solutions.

The eigenvalues (relative contributions to the total variance) for the first 20 successive principal axis factors are shown in Figure 1. We note that (1) Similarity in the relative contributions to the total variance is observed between the combined (a) and the separate male and female analyses (b); (2) A probability of 11 or 12 interpretable factors is indicated by the 'Scree'.

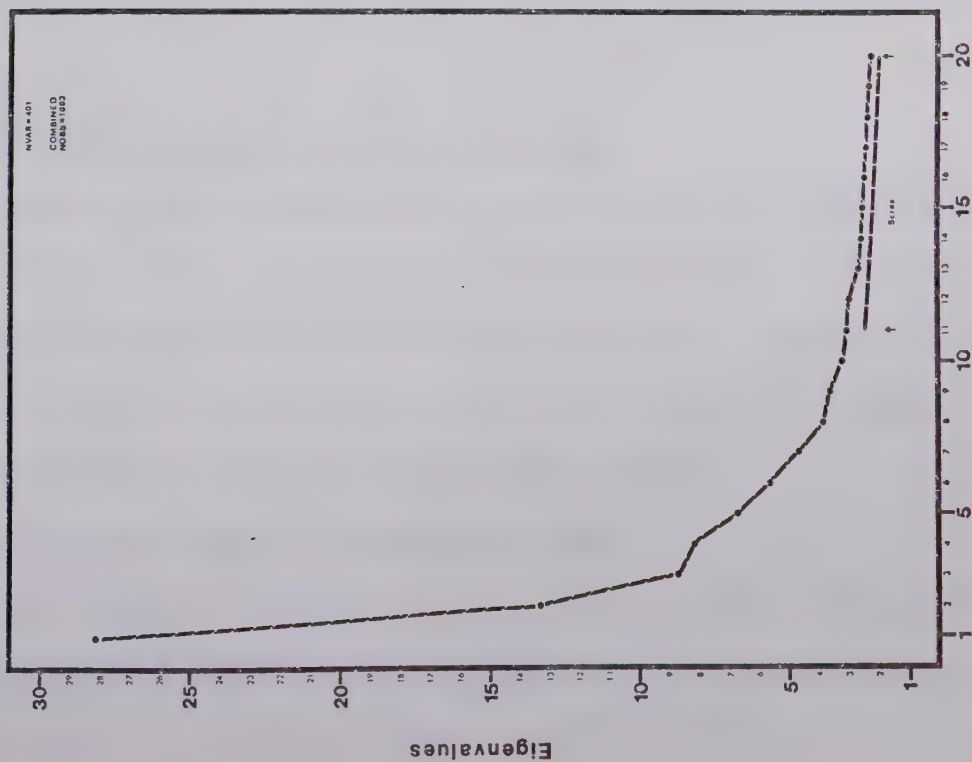
Item content of the factors is shown in Table 2, and it should be noted that, for convenience and so that the male and female factors



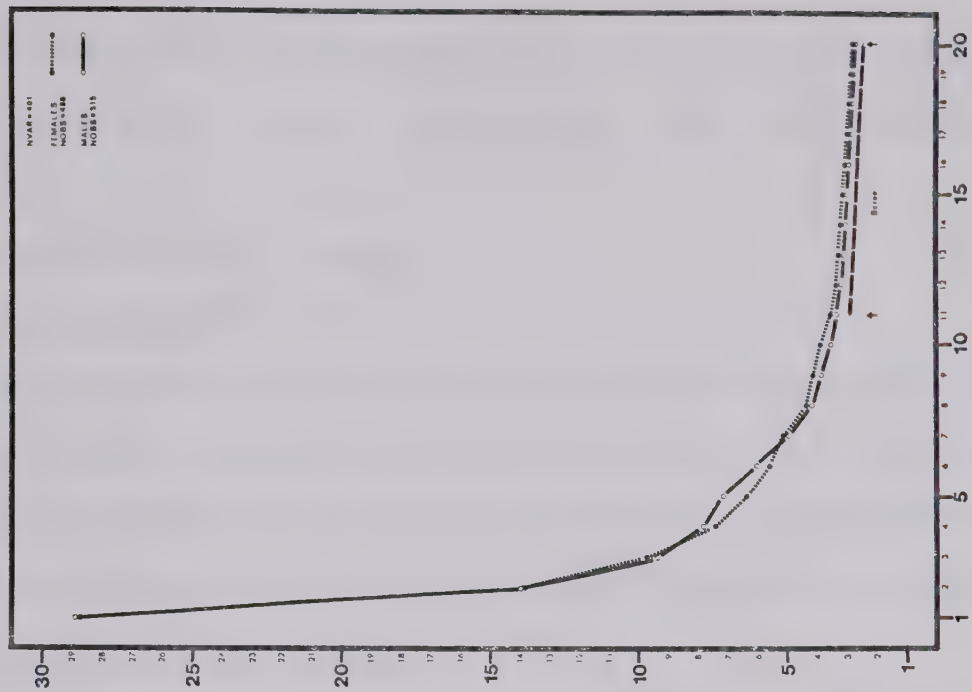
Figure 1. Eigenvalues and successive factors extracted for (a) combined male and female data, and (b) separate male (N=515) and female (N=488) analyses. Note that the 'Scree', in each case, indicates 11 or 12 factors.



a



b



Successive Factors Extracted





could be compared with the combined solution, the salients are not here rank-ordered in terms of the magnitude of the factor loadings.

#### Interpretation of the Factors.

##### Factor I, Sociability (SY)

This factor is well marked by talkativeness, mixing with people, interacting with the group, enjoying parties, and being at ease in social situations. Arising as the first factor in all three, male, female, and combined analyses, it has been interpreted as Sociability.

##### Factor II, Social Shyness (SH)

Here is another social-content factor, differing from Factor I in that here we see the pattern of preference to be alone, avoiding crowds, a dislike for bustle and excitement, staying at home rather than attending parties, etc. Although this is the second factor of the combined solution it appears as the third male and third female factor.

##### Factor III, Adjustment - Emotionality (AE)

Frequent worry, being tense or 'highly-strung', loss of sleep over worries, etc., combine to identify this factor. For the male solution this factor split the male second factor so that M IIa loads on this factor (AE) while the other half M IIb loads on Factor IV. AE is represented with the second female factor.

##### Factor IV, Mood Swings - Readjustment (MR)

Mood swings, moodiness, listlessness, happiness and depression for no apparent reason, etc., aggregate for the interpretation of this factor. As mentioned above this is the M IIb half of the second



male factor. It is represented by the fourth factor in the female solution.

#### Factor V, Trust vs Suspicion (TS)

Here is a factor that, in addition to the match with the fifth male factor, intimates the possibility a female factor with the inclusion of female factors eight and fifteen. Being treated less reasonably than one's intentions deserve, other people taking credit for things one has done, keeping to the 'straight and narrow' for fear of being caught, load on C V M V, and F VIII, while F XV includes additional loadings on feeling that nice people outnumber objectionable people, being seriously slighted, and suspiciousness of others. Definitive interpretation of this factor must wait for the 12 factor solution.

#### Factor VI, Persistence (PS)

This is a very clearly marked factor, which corresponds to the seventh male factor and the fifth female factor.

#### Factor VII, Impulsivity (IP)

Another very clearly marked factor, this arises as the eighth male and the sixth female factor.

#### Factor VIII, Freudian Introversion (FI)

This factor interpretation is tentative and awaits further considerations. The salient aggregation includes: keeping a personal diary, being considered a 'quitter', complaints of ill health, liking to be alone with one's thoughts, and sex, etc. This is the fourth male factor and the seventh in the female solution.



TABLE 2

## 20 Factor Varimax Solution

(C=Combined; M=Male; F=Female Solution)

Variable Factor	SOCIABILITY (SY)	Item	CI	Loading and Factor MI FI
I				
14	I am a very talkative person.		-.439	-.413 .493
34	When I am with someone else it is easy for me to find something to talk about.		-.582	-.583 .596
37	I find it easy to act naturally at a party.		-.598	-.600 .588
54	In a group of people I keep quiet.		.587	.619 -.589
55	I sometimes find it hard to stick up for my rights because I am so reserved.		.473	.518 -.432
61	I am a good social mixer.		-.656	-.660 .664
68	I am well at ease with members of the opposite sex.		-.565	-.610 .512
74	I would rate myself as a talkative individual.		-.474	-.449 .514
77	I like to meet with people socially.		-.405	-.437 -
81	I usually take the initiative in making new friends.		-.563	-.551 .540
94	I find it difficult to talk with a person I have just met.		.634	-.653
97	I readily introduce myself when thrown by chance with a stranger.		-.468	-.485 .420
108	There usually seems to be some kind of a barrier between me and the opposite sex.		.492	.507 -.439
114	It is difficult for me to chat about things in general with people.		.547	.597 -.547
134	I take an active part in all conversation going on around me.		-.431	-.409 .446





155	I often feel out of place in company.	.602	.584	-.585
157	At a social gathering I interact easily with other people.	-.724	-.708	.734
174	I am likely not to speak to people until they speak to me.	.612	.607	-.583
175	I am certainly lacking in self-confidence.	.519	.557	-.502
177	I usually feel nervous and am not at ease at a formal dance or party.	.542	.470	-.568
181	I am a sociable, outgoing person.	-.591	.531	.649
194	When out with other people I prefer to keep quiet.	.562	.559	-.579
195	At a social event people are usually glad to meet me.	-.406	-	.426
197	I keep to the people I already know instead of seeking new friends.	.497	.460	-.485
217	I feel comfortable with people I have never seen before.	-.537	-.537	.531
234	I find it difficult to carry on a light conversation with strangers.	.590	.604	-.585
254	I find it easy to start conversation with strangers.	-.682	-.667	.688
255	I am most often successful in dealing with people.	-.448	-.427	.485
261	I generally keep in the background on social occasions.	.624	.577	-.662
274	I do less than my share of talking in a conversation.	.539	.552	-.567
275	In a group of people, new acquaintances or strangers pay little attention to me.	.558	.546	-.572
277	I readily come forward on social occasions.	-.453	-	.512
294	I talk with strangers when I travel.	-.490	-.564	-
297	I try to avoid contacts with new people.	.417	.462	-
301	Most people have more friends than I have.	.407	-	-.430
334	It is easy for me to talk with people.	-.716	-.733	.721
337	I have difficulty in making new friends.	.641	.594	-.646
354	While in trains, busses, etc., I often talk to strangers.	-.456	-.553	-
355	I can readily express my opinions.	-.461	-.539	.414
361	Can you easily get some life into a rather dull party?	-.476	-.491	.515
374	In a group of people I find myself at a loss for words.	.613	.616	.611
395	I sometimes feel socially inferior.	.462	.504	-.434



## Additional Male and Female Variables:

17	I do not introduce myself to strangers at a social gathering.	-	.426	-
57	At times, I have to fight against bashfulness.	-	.423	-.439
75	I am troubled by inferiority feelings.	-	.416	-
377	Are you often self-conscious in front of strangers?	-	.503	-.534
394	I am a better listener than a conversationalist.	-	.409	-.414
317	Socially I am not considered reticent and retiring.	-	-	.453

Factor	SOCIAL SHYNESS (SH)	CII	MIII	FIII
<u>II</u>				
1	At a party I like to meet as many people as I can.	-.459	-.491	-.437
38	I prefer working alone to working in a group.	.363	.400	.326*
44	I enjoy the excitement of a crowd.	-.469	-.494	-.485
77	I like to meet with people socially.	-.399	-.367	-.437
106	I like to get out and about a lot.	-.492	-.457	-.514
138	I like to be considered as "one of the group".	-.394	-.374	-.405
151	I often like to "dance and throw my cares away".	-.438	-.467	-.430
201	I enjoy being in a crowd just to be with people.	-.562	-.552	-.559
204	I appreciate quiet amusements rather than exciting ones.	.453	.505	.478
221	I prefer to stay at home rather than attend social affairs.	.565	.504	.623
241	I like to mix socially with people.	-.550	-.514	-.570
257	I prefer to visit with one person rather than with a group of people.	.465	.503	.445
264	When I get bored I like to stir up some excitement.	-.374	-.366	-.322*
281	I spend my vacation at a lively resort rather than a quiet place.	-.458	-.489	-.408
304	I like plenty of bustle and excitement around me.	-.578	-.611	-.588
321	I enjoy parties where there are lots of people.	-.592	-.606	-.605
366	I like to be active.	-.370	-	-.442
378	I like people around me.	-.570	-.547	-.581
381	I prefer to stay at home with a hobby rather than attend a lively party.	.586	.526	.660



## Additional Male and Female Variables:

181	I am a sociable, outgoing person.	-	-.385	-
277	I readily come forward on social occasions.	-	-.404	-
101	I would like to work alone in some isolated place.	-	-	.343*
166	I believe that to make the best use of life one should be active.	-	-	-.393

\*Not a significant loading at this level.

Factor	ADJUSTMENT - EMOTIONALITY (AE)	CIII	MIII <sup>a</sup>	FII
III				
12	I am troubled by unusual fears or distastes.	.386	.399	.413
32	I am usually free from worry about possible misfortunes.	-.511	-.372	-.561
42	I am easily "rattled" and upset.	.480	-	.548
45	Have you often lost sleep over your worries?	.456	.518	.497
125	Do you suffer from "nerves"?	.452	.386	.532
131	I am considered an easy-going person not bothered about having everything "just so".	-.369	-	-.421
165	I frequently worry about possible misfortunes.	.480	.438	.504
271	I am so concerned about the future that I don't get as much out of the present as I might.	.398	-	.435
285	Would you rate yourself as a tense or "highly strung" individual?	.465	.391	.537
302	I get over a humiliating experience very quickly.	-.373	-	-.349
322	I am frequently annoyed by quite small setbacks.	.398	.479	.494
325	I seldom suffer from sleeplessness.	-.368	-	-.394
365	I do not let small matters disturb me.	-.367	-	-.400

## Additional Female Variables:

152	Sometimes quite trivial troubles keep going around in my mind.	-	-	.378
111	I sometimes take my work as if it were a matter of life and death.	-	-	.387
189	I am rarely troubled about feelings of guilt.	-	-	-.359



309	I seldom worry about things I should not have done or said.	-	-	-.400
312	I rarely get palpitation or thumping in my heart.	-	-	-.372
Factor	MOOD SWINGS - READJUSTMENT (MR)	CIV	MI <sup>b</sup>	FIV
<u>IV</u>				
22	I often feel "just miserable" for no good reason.	.451	.399	-.440
62	I am inclined to be moody.	.364	.482	-.335*
85	Have you ever been bothered by having a useless thought come into your mind repeatedly?	.374	-	-.389
152	Sometimes quite trivial troubles keep going around in my head.	.385	.525	-
162	Sometimes strong emotional moods come over me without apparent cause.	.532	.549	-.519
202	My happiness is sometimes so great that I become afraid that it cannot last.	.388	.378	-.318*
205	Have you often felt listless and tired for no good reason?	.504	.508	-.525
212	I often get a feeling of vague restlessness.	.379	.379	-.408
242	I sometimes feel happy and sometimes depressed without any apparent reason.	.547	.546	-.522
250	There are times when it seems that everyone is against you.	.358	.388	-.364
282	I have periods when I feel unusually cheerful without any special reason.	.399	-	-.398
292	I have days in which it seems that everything goes wrong.	.384	.359	-.354
332	I sometimes get very bad headaches.	.383	-	-.350
345	You feel lonesome even when you are with other people.	.383	.388	-.364
346	I sometimes lack energy when I need it.	.423	.355	-.501
390	There have been times when you have been bothered by the idea that someone is reading your thoughts.	.353	-	-

\*Not a significant loading at this level.





Factor	TRUST vs SUSPICION (TS)	CV	MV	FVIII
<u>V</u>				
11	I believe in the idea that we should "eat, drink and be merry, for tomorrow we die"	.402	.463	.372
50	I have been treated less reasonably than my good intentions deserve.	.358	.364	-
51	I am a carefree individual.	.389	.414	.403
89	Most people keep to the "straight and narrow path" only because of their fear of being caught.	.401	.405	-
251	It is difficult for me to understand people who get very concerned about things.	.370	.418	.349
270	I often wonder what hidden reason another person may have for doing something nice for me.	.426	-	-
300	Most people do not respect the rights of others.	.375	-	-
310	Other people too often take the credit for things you yourself have done.	.455	.359	-
Additional Male and Female Variables:				
130	I distrust people I have just met until I get better acquainted.	-	.391	-
188	When men (or women) get together in a group the topic of conversation usually turns toward sex.	-	.391	.337
211	I am a happy-go-lucky individual.	-	.362	.305
311	I generally feel as though I haven't a care in the world.	-	.359	.310
76	I would rather feel free from commitments to others than risk serious disappointments or failure later.	-	-	.361
236	The best way to handle people is to tell them what they want to hear.	-	-	.337



FXV

90 People pretend to care more about one another than they really do. .328  
 98 I feel that nice people outnumber objectionable people. -.476  
 110 The number of "two faced" individuals I have known is  
 actually very small. -.420  
 190 I have been seriously slighted more than once. .385  
 269 Most public office holders generally put public interests  
 ahead of their own. -.323  
 270 I often wonder what hidden reason another person may have  
 for doing something nice for me. .316  
 310 Other people too often take the credit for things you  
 yourself have done. .321  
 329 Far too many people try to take as much as they can, and give  
 as little as possible back to society. .372  
 58 I readily associate with people holding views opposed to  
 my own. -.265  
 129 Most people today try to do an honest day's work for a  
 day's pay. -.280  
 230 I know of no one who would wish me harm. -.254  
 250 There are times when it seems that everyone is against you. .280  
 330 I have never been blamed without cause. -.252  
 350 No one has ever deliberately made things hard for me. -.271  
 300 Most people do not respect the rights of others. .304



Factor	PERSISTENCE (PS)	CVI	IVII	FV
<u>VI</u>				
19	Whatever the difficulties I stick to my original intentions.	.381	.347	-.337*
59	I persist on a job until it is completed even when others have given up.	.522	.534	-.503
79	I find myself starting things and then losing interest in them.	-.468	-.467	.356
119	I give up easily.	-.504	-.495	.494
139	When perplexed by a difficult problem I keep trying to solve it.	.507	.425	-.505
179	My enthusiasm for a new project does not persist.	-.397	-.377	-
307	I enjoy thinking out complicated problems.	.359	.343	-.453
319	If a problem is difficult I find it best to drop it.	-.482	-.371	.511
331	I am inclined to take my work casually, that is as a matter of course.	-.405	-.412	.338*
339	I believe that "if at first you don't succeed, try, try again".	.354	.337	-.311*
359	It is hard for me to work intensely on a scholarly problem for more than an hour or two at a stretch.	-.405	-.395	.423
Additional Male and Female Variables:				
91	Many of my friends think that I take my work too seriously.	-	.316	-.349
99	I am able to work long hours without rest.	-	.354	-.372
303	I seldom plan things carefully well ahead of time.	-	-.315	-
27	I prefer a job that requires decision making rather than routine answers.	-	-	-.341*
107	I like to do work which requires study or thought.	-	-	-.477
123	When the odds are against me I still think it is worth taking a chance.	-	-	-.361
206	I can turn out a lot of work in a short time.	-	-	-.398
*Not a significant loading at this level.				





Factor	IMPULSIVITY (IP)	CVII	MVIII	FVI
<u>VII</u>				
3	I often act on the first thought that comes into my head.	.646	-.565	-.649
4	I enjoy taking risks just for fun.	.330	-.322	-
23	I seldom stop to think things over before I act.	.501	-.355	-.570
39	My interests change quickly from one thing to another.	.356	-.303	-.417
43	I often act on suggestions quickly, without stopping to think.	.583	-.470	-.628
63	Uncontrolled impulsiveness is not part of my make-up.	-.390	.347	.400
83	I sometimes say the first thing that comes into my head.	.468	-.531	-.421
102	I generally keep cool and think clearly in exciting situations.	-.330	-	.377
163	I believe in the saying "look before you leap".	-.414	.412	.451
203	I usually say what I feel like saying at the moment.	.393	-.324	-
223	I seldom make decisions on the spur of the moment.	-.463	.396	.507
243	I rarely get into a jam because I do things without considering the consequences.	-.301	-	-
263	On the whole I am rather an impulsive person.	.544	-.431	-.600
303	I seldom plan things carefully well ahead of time.	.304	-	-
343	Do people say you sometimes behave rashly?	.403	-.371	-.471
363	I rarely act without careful consideration.	-.468	.453	.525
Additional Male and Female Variables:				
31	Other people think of me as being very serious minded.	-	.305	-
191	Do other people regard you as being a serious, sober individual?	-	-	.366



For this factor the items have been rank-ordered in terms of the loadings on the Combined solution.

Factor	FREUDIAN INTROVERSION (FI)	CVIII	MIV	FVII
<u>VIII</u>				
287	I do not keep a personal diary.	-.568	.582	-.509
379	People do not consider me to be a quitter.	-.554	.574	-.567
272	I do not have spells of hay fever or asthma.	-.540	.543	-.539
387	I do not like to have time to be alone with my thoughts.	.512	-.478	.534
92	I have had no difficulty starting or holding my urine.	-.487	.504	-.518
392	I seldom have cause to alter my plans for reasons of health.	-.467	.497	-.449
373	I seldom throw my weight around.	-.428	-.384	-.489
280	Good manners are not that important.	.423	-.390	.465
52	I don't often notice my ears ringing or buzzing.	-.408	.444	-.375
388	I do not believe that a successful marriage is based on sex.	-.406	-	-.424
187	I do not think a great deal.	.404	-.423	.367
336	Discussion of local problems does not interest me.	.385	-.371	.411
316	I don't believe in showing up my neighbour even if he cheats me over small matters.	-.369	.353	-.377
112	I never get attacks of shaking or trembling.	-.360	.437	-
63	Uncontrolled impulsiveness is not part of my make-up.	-.359	.384	-.320
317	Socially I am not considered reticent and retiring.	-.359	-	-.353
70	I do not suspect the loyalty of friends.	-.356	-	-.418
21	I do not enjoy meeting new people.	.320	-	-
230	I know of no one who would wish me harm.	-.315	-	-.381
Additional Male and Female Variables:				
28	I do not discuss embarrassing subjects with the opposite sex.	-	-.366	-
237	I am not considered a shy person.	-	.384	-
192	I seldom worry about my health.	-	-	-.351
350	No one has ever deliberately made things hard for me.	-	-	.342



Factor	Dominance (AD)	CIX	MVI	FXI
<u>IX</u>				
13	I am satisfied to let someone else take the lead in a group.	-.470	.411	.432
93	I dominate many of my acquaintances of about my own age.	.412	-.423	-.405
133	In group undertakings I almost always feel that my own plans are best.	.482	-.514	-.428
198	People say that I often try to sway the group.	.450	-.428	-.416
213	I speak out in meetings to oppose those whom I feel sure are wrong.	.380	-	-
226	I often set a pace which others find hard to keep up with.	.330	-	-
253	When I work on a committee I like to take charge of things.	.628	-.602	-.576
293	I like to "take command" by knowing what is best for my group.	.562	-.512	-.507
333	People have told me I am aggressive.	.328	-	-
Additional Male and Female Variables:				
14	I am a very talkative person.	-	-.431	-
74	I would rate myself as a talkative individual.	-	-.413	-
394	I am a better listener than a conversationalist.	-	.415	-
FX				
33	If I hold an opinion that is different from that expressed by a lecturer, I am likely to tell him about it during or after the lecture.	-	-	.381
53	I am often inclined to go out of my way to win a point with someone who has opposed me.	-	-	.352
55	I sometimes find it hard to stick up for my rights because I am so reserved.	-	-	-.525
100	When people are unreasonable I just keep quiet.	-	-	-.394
153	I am considered to be a submissive person.	-	-	-.381



193	My opinion seldom sways others.	-	-	-.306
213	I speak out in meetings to oppose those whom I feel sure are wrong.	-	-	.439
273	I am easily downed in an argument.	-	-	-.415
296	My own ideas come second to getting along smoothly with people.	-	-	-.361
353	I seldom fight for what I believe is right.	-	-	-.373
355	I can readily express my opinions.	-	-	.324

Factor	SEX and SUPEREGO (SX/SG)	CXII	MIX	FIX
<u>X</u>				
8	I like to talk about sex	-.451	-	-.440
49	It is alright to get around the law if you don't break it.	-.296	-.358	-
69	People today have forgotten how to feel properly ashamed of themselves.	.359	.381	.427
148	Most people think too much about sex.	.442	.417	.485
169	I am greatly concerned over the morals of my generation.	.442	.511	.456
228	I am embarrassed by dirty stories.	.383	.380	.382
288	I never attend a sexy show if I can avoid it.	.392	-	.405
308	I like to talk about sex.	-.451	-	-.467
328	It is alright to read sexually suggestive literature.	-.552	-.456	-.525
349	I like worldliness in people.	-.302	-	-
368	I approve of contemporary sexual morality.	-.527	-.490	-.476

Additional Male and Female Variables:				
4	I enjoy taking risks just for fun.	-	-.345	-
186	I seldom have the wanderlust.	-	.348	-
284	I find little attraction toward the clashing of colours and irregular forms of modern art.	-	.318	-
116	Too much time is spent in social responsibilities and organizations.	-	-	.337





Factor	GENERAL ACTIVITY (GA)	CXIV	MX	FXIII
<u>XI</u>				
66	Physical work tires me more rapidly than most people.	- .399	- .400	- .320
84	At a sporting event I am often aroused to wild enthusiasm.	.322	-	.310
87	Are you more interested in athletics than in intellectual things?	.446	.480	.290
164	I prefer sports which have lots of action.	.487	.497	.371
204	I appreciate quiet amusements rather than exciting ones.	-.256	-	-
244	I enjoy many different kinds of play and recreation.	.383	.367	.362
266	I am not energetic and find it difficult to keep busy.	-.267	-.355	-.272
306	I am regarded as a very energetic person.	.381	.385	.306
366	I like to be active.	.255	.400	-
	Additional Male and Female Variables:			
252	I almost always feel well and strong.	-	.301	-
46	I often wonder where other people get so much energy.	-	-	-.261
124	I love travel and adventure.	-	-	.314
186	I seldom have the wanderlust.	-	-	-.325
211	I am a happy-go-lucky individual.	-	-	.273
291	I believe that sobriety is preferable to carefree frivolousness.	-	-	-.279
294	I talk with strangers when I travel.	-	-	.286
	COOPERATIVENESS - CONSIDERATENESS (CC)	CXI		
<u>XII</u>				
56	I try to be a "Good Samaritan".	-.416		
60	I do what is necessary to keep harmony in a group meeting.	-.303		
178	I often inconvenience myself to oblige others.	-.413		
196	I easily become involved in straightening out other people's problems.	-.361		
220	At a restaurant I will do without rather than putting the staff to extra trouble.	-.325		



276	I would be agreeable to work on a charity drive.	- .310
296	My own ideas come second to getting along smoothly with people.	- .305
340	If I can, I give a helping hand whenever needed.	- .340
36	I am aroused by a speaker's description of unfortunate conditions in a locality or country.	MXII .295
56	I try to be a "Good Samaritan".	.414
60	I do what is necessary to keep harmony in a group meeting.	.287
75	I am troubled by inferiority feelings.	.255
103	Before I do something I try to consider how my friends will react to it.	.258
153	I am considered to be a submissive person.	.254
167	I react to new ideas which I hear or read about by analyzing them to see if they fit in with my point of view.	.251
178	I often inconvenience myself to oblige others.	.416
180	You can spend too much time helping others.	- .306
196	I easily become involved in straightening out other people's problems.	.354
340	If I can, I give a helping hand whenever needed.	.259
367	I have frequently found myself, when alone, pondering such abstract problems as free will, evil, etc.	.250
103	Before I do something I try to consider how my friends will react to it.	FXII .273
109	I have often gone against my parent's wishes.	- .352



118	I often find neighbourhood conversations boring.	- .256
158	I seldom seek the advice of other people.	- .266
200	People who "sound off" should consider the feelings of others.	.367
209	As a child I used to be able to go to my parents with my problems.	.263
229	There are far too many useless laws which hamper an individual's personal freedom.	- .354
233	I avoid arguing over a price with a clerk or salesman.	.289
256	I do not worry about having made a faux pas (i.e., a social error).	- .260
260	In discussing touchy subjects I never forget politeness.	.271
298	I usually go along with what the gang wants to do.	.291
313	I am unlikely to talk back to a policeman or other person in authority.	.408
369	I generally prefer to associate with polite rather than rough rebellious persons.	.443





### Factor IX, Dominance (AD)

Items appearing as salients include: taking command of the group, dominating acquaintances, trying to sway the group, and feeling that one's own plans are best go into interpreting this factor which is the sixth male factor and the eleventh female factor. In addition female factor ten is a dominance factor with salients on sticking up for one's rights, not being downed in an argument, speaking out to oppose those whom you are sure are wrong, etc.

### Factor X, Sex and Superego (SX/SG)

The putative factor hypotheses of Sex (SX) and Superego (SG) would appear to have fused to form an item aggregation that is here tentatively interpreted as a combination of markers for Sex and Superego. Concern over morals, talking and thinking about sex, reading sexually suggestive literature, and approval of contemporary sexual morality, contribute to the interpretation of this factor. This is the twelfth factor in the combined solution, and the ninth factor in the male and female solutions.

### Factor XI, General Activity (GA)

Preference for athletics to intellectual things, action sports, enjoyment of many different kinds of play and recreation combine for the fourteenth combined factor, tenth male factor, and the thirteenth female factor. Loadings on travel and adventure, the 'wanderlust', are also observed for the female factor.



### Factor XII, Cooperativeness-Considerateness (CC)

A tentative match is observed between the eleventh combined factor, twelfth male factor and twelfth female factor, with reservations, due to the differing item aggregations across the separate solutions. Yet, the item content within each factor is quite meaningful, and has been interpreted as Cooperativeness-Considerateness.

### Remaining Factors in the Combined, Male and Female Solutions.

The remaining factors in the combined, male, and female 20 factor solutions were either uninterpretable or interpreted with caution, and will only be briefly alluded to.

In the combined solution Factor X suggested Sensation Seeking with a loading on the male-female variable (401). Factor XIII was uninterpretable. Factor XV appeared as a possible Rhathymia factor but had too few small loadings. Factor XVI resembled a Superego factor but again had too few small loadings. Factors XVII through to XX were uninterpretable.

Male Factor XI had the appearance of Superego. Factor XIII was not interpretable. Factor XIV was possibly an Inferiority factor but had too few loadings of any merit. Factor XV suggested a Social Responsibility factor, and Factors XVI to XX were uninterpretable.

In the female solution Factor XIV might be a Thinking Introversive factor but suffers from the lack of significant salients. The remaining Factors XVI through to XX were uninterpretable.

Table 3 summarizes the twelve matching factors for the combined, male, and female 20 factor Varimax solutions. Contributions to



Table 3  
Matching Factors for the Combined, Male, and Female  
20 Factor Varimax Solutions

FACTOR	FACTOR TITLE	COMBINED SSCL			MALE SSCL			FEMALE SSCL		
I	Sociability (SY)	I	20.0	I	21.1	I	20.3	I	20.3	
II	Social Shyness (SH)	II	8.7	III	9.9	III	9.1	III	9.1	
III	Adjustment-Emotionality (AE)	III	7.9	IIa	11.3	II	9.6	II	9.6	
IV	Mood Swings-Readjustment (MR)	IV	7.3	IIb		IV	7.5	IV	7.5	
V	Trust vs Suspicion (TS)	V	7.0	V	6.3	VIII & XV	5.4	VIII & XV	5.4	
VI	Persistence (PS)	VI	6.4	VII	5.6	V	7.3	V	7.3	
VII	Impulsivity (IP)	VII	5.7	VIII	5.3	VI	7.0	VI	7.0	
VIII	Freudian Introversiion (FI)	VIII	5.5	IV	6.6	VII	5.8	VII	5.8	
IX	Dominance (AD)	IX	5.4	VI	5.8	XI & X	4.4	XI & X	4.4	
X	Sex and Superego (SX/SG)	XII	4.2	IX	5.1	IX	5.2	IX	5.2	
XI	General Activity (GA)	XIV	3.7	X	4.7	XIII	4.3	XIII	4.3	
XII	Cooperativeness-Considerateness (CC)	XI	4.4	XII	4.4	XII	4.4	XII	4.4	



the variance for each factor for their respective solution, are shown in terms of the sum of the squared column loadings (SSCL).

#### Focusing on Replicable Factors.

With the 'Scree' test indicating 11 or 12 factors, and with 12 identifiable factors in the 20 factor solutions, it was decided to rotate the first 12 factors, which represented a more restricted set of factors of higher variance contribution, for the combined data only. The intent here is to focus on the replicable factors by obtaining a simple structure solution concentrated on these factors. For these reasons the combined 12 factor solution will be featured as the definitive solution, and will be presented in detail.

The conceptual framework for referring to the 12 factor solution as the 'definitive' solution in focusing on the replicable factors, is extensively based on a number of previous researches. Guilford's system eventuated in 10 identifiable primary factors (Guilford and Zimmerman, 1949); Eysenck's analysis of EPI items resulted in 14 identifiable factors (Eysenck and Eysenck, 1969); analysis of Sells, Demaree and Will, and Eysenck marker-items produced 15 identifiable factors<sup>1</sup> (Howarth and Browne, 1971a); an item-factor-analysis of Cattell's 16 PF obtained 10 identifiable factors (Howarth and Browne,

1. Dr. Howarth comments (personal communication): "Three factors in the HPQ were hard to safely identify and these (e.g. GT-group tolerance) could not be replicated in the HPQ2 study. Therefore, there only appear to be a dozen or so replicable factors. In the EPI study (60 variables, 1319 subjects) if we leave aside the two lie scale factors, and combine the two sociability factors and the two super-ego factors, we are left with 11 factors. The region 10-12 factors thus appears to be a likely target".





1971b), and an item-factor-analysis of EPI resulted in 13 identifiable factors, excluding the two 'Lie' scale factors (Howarth and Browne, 1971c). Therefore a strong probability exists that we might obtain between 10 and 13 stable and replicable primary personality factors within a given multivariate item aggregation.

#### The Combined 12 Factor Varimax Solution.

A comparison of the relative contributions to the variance between the 20 and 12 factor solutions is shown in Figure 2. As would be expected maximum re-allocation of the variance occurs within the first three Varimax factors; this is primarily observed in the increase for the second and third factors respectively.

In presenting the 12 factor solution in the body of the text, the item-variables are rank-ordered in terms of the magnitude of their respective loadings. This has the immediate advantage of presenting the most significant salients contributing to each particular factor that apply the most weight in the interpretation of the factor.

#### Interpretation of the Factors.

Out of the 400 personality variables in the study, 205 showed significant, non-overlapping loadings on the combined 12 factor Varimax solution.

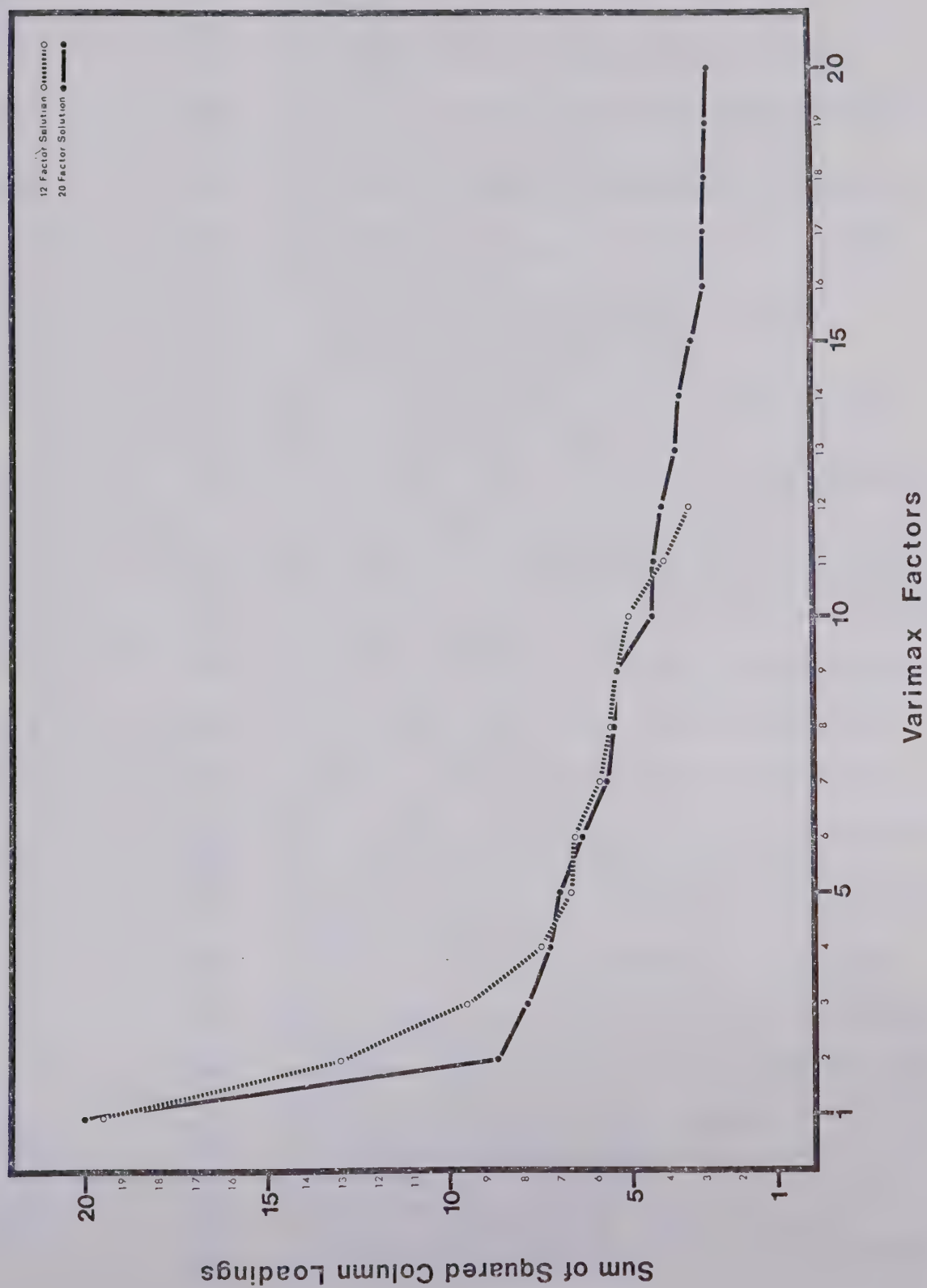
##### Factor 1, Sociability (SY)

<u>Variable</u>	<u>Loading</u>	<u>Item</u>
157	-.713	At a social gathering I interact easily with other people.
334	-.712	It is easy for me to talk with people.



Figure 2. Sum of the squared column loadings and Varimax factors for the 12 and 20 factor combined solutions. Note the increase in variance for the second and third factors in the 12 factor solution.









254	-.672	I find it easy to start conversation with strangers.
61	-.652	I am a good social mixer.
261	.629	I generally keep in the background on social occasions.
94	.622	I find it difficult to talk with a person I have just met.
337	.620	I have difficulty in making new friends.
374	.606	In a group of people I find myself at a loss for words.
174	.602	I am likely not to speak to people until they speak to me.
54	.600	In a group of people I keep quiet.
37	-.585	I find it easy to act naturally at a party.
181	-.582	I am a sociable, outgoing person.
155	.578	I often feel out of place in company.
34	-.576	When I am with someone else it is easy for me to find something to talk about.
194	.572	When out with other people I prefer to keep quiet.
234	.572	I find it difficult to carry on a light conversation with strangers.
81	-.552	I usually take the initiative in making new friends.
68	-.551	I am well at ease with members of the opposite sex.
274	.548	I do less than my share of talking in a conversation.
275	.547	In a group of people, new acquaintances or strangers pay little attention to me.
217	-.530	I feel comfortable with people I have never seen before.
114	.530	It is difficult for me to chat about things in general with people.
177	.525	I usually feel nervous and am not at ease at a formal dance or party.
377	.520	Are you often self-conscious in front of strangers?
175	.503	I am certainly lacking in self-confidence.
74	-.496	I would rate myself as a talkative individual.
197	.489	I keep to the people I already know instead of seeking new friends.
361	-.485	Can you easily get some life into a rather dull party?
108	.480	There usually seems to be some kind of a barrier between me and the opposite sex.
55	.480	I sometimes find it hard to stick up for my rights because I am so reserved.
294	-.479	I talk with strangers when I travel.
355	-.478	I can readily express my opinions.
14	-.463	I am a very talkative person.
395	.457	I sometimes feel socially inferior.
277	-.452	I readily come forward on social occasions.
97	-.451	I readily introduce myself when thrown by chance with a stranger.



354	-.448	While in trains, busses, etc. I often talk with strangers.
255	-.435	I am most often successful in dealing with people.
134	-.430	I take an active part in all conversation going on around me.
57	.419	At times, I have to fight against bashfulness.
394	.409	I am a better listener than a conversationalist.
297	.407	I try to avoid contacts with new people.
77	-.406	I like to meet with people socially.

This item aggregation of 43 salients with loadings greater than .400 clearly represents a factor interpretable as Sociability. This has been a central factor arising in factor analyses of 'extraversion' items and has been featured by Guilford (Guilford and Guilford, 1934; 1936); Bendig (1962a; 1962b); Eysenck (Eysenck and Eysenck, 1963; 1969), and Howarth and Browne (1971c). The variance accounted for by this factor, in terms of the sum of the squared column loadings, equalled 19.5. [21% of the variance].

#### Factor 2, Adjustment - Emotionality (AE)

<u>Variable</u>	<u>Loading</u>	<u>Item</u>
125	.527	Do you suffer from "nerves"?
22	.516	I often feel "just miserable" for no good reason.
152	.510	Sometimes quite trivial troubles keep going around in my mind.
42	.508	I am easily "rattled" and upset.
162	.507	Strong emotional moods come over me without apparent cause.
45	.492	Have you often lost sleep over your worries?
242	.488	I sometimes feel happy and sometimes depressed without any apparent reason.
165	.473	I frequently worry about possible misfortunes.
322	.471	I am frequently over-annoyed by quite small setbacks.
285	.459	Would you rate yourself as a tense or "highly-strung" individual?
12	.455	I am troubled by unusual fears or distastes.



345	.455	You feel lonesome even when you are with other people.
205	.432	Have you often felt listless and tired for no good reason?
62	.427	I am inclined to be moody.
250	.426	There are times when it seems everyone is against you.
32	-.425	I am usually free from worry about possible misfortunes.
202	.419	My happiness is sometimes so great that I become afraid that it cannot last.
290	.414	I get very tense and anxious when I think other people are disapproving of me.
75	.393	I am troubled by inferiority feelings.
325	-.387	I seldom suffer from sleeplessness.
365	-.383	I do not let small matters disturb me.
212	.381	I often get a feeling of vague restlessness.
401	-.374	Male - female variable.
175	.367	I am certainly lacking in self-confidence.
390	.364	There have been times when you have been bothered by the idea that someone is reading your thoughts.
346	.361	I sometimes lack energy when I need it.
111	.359	I sometimes take my work as if it were a matter of life and death.
302	.353	I get over a humiliating experience very quickly.
332	.351	I sometimes get very bad headaches.
247	.350	Are you frequently "lost in thought" even when supposed to be taking part in a conversation?
252	-.356	I almost always feel well and strong.

Thirty-one salients with loadings equal to or greater than .350 combine to make up this factor which has been interpreted as Adjustment - Emotionality. There is a resemblance here to Eysenck's 'Neuroticism' factor as it appears on the N scale of the EPI. This was the first factor to arise in Sells, Demaree and Will (1970); in the HPQ (Howarth and Browne, 1971a), and in the 16 PF (Howarth and Browne, 1971b). This originally appeared as Guilford's second factor (Emotional sensitivity) in 1936. Although this factor has appeared under a variety of different names, neuroticism, anxiety, emotional stability, adjustment, etc., the meaning in the total content item aggregation is similar across studies. The sum of the squared column





loadings for this factor is 13.1. [14% of the variance].

### Factor 3, Social Shyness (SH)

<u>Variable</u>	<u>Loading</u>	<u>Item</u>
381	.559	I prefer to stay at home with a hobby rather than attend a lively party.
321	-.548	I enjoy parties where there are lots of people.
304	-.523	I like plenty of bustle and excitement around me.
221	.527	I prefer to stay at home rather than attend social affairs.
201	-.512	I enjoy being in a crowd just to be with people.
106	-.511	I like to get out and about a lot.
241	-.505	I like to mix socially with people.
378	-.490	I like people around me.
44	-.457	I enjoy the excitement of a crowd.
204	.457	I appreciate quiet amusements rather than exciting ones.
138	-.456	I like to be considered as "one of the group".
1	-.446	At a party I like to meet as many people as I can.
281	-.434	I spend my vacation at a lively resort rather than a quiet place.
257	.428	I prefer to visit with one person rather than with a group of people.
151	-.420	I often like to "dance and throw my cares away".
366	-.409	I like to be active.
77	-.373	I like to meet with people socially.
166	-.356	I believe that to make the best use of life one should be active.

Here is the appearance of a second 'Sociability' factor with 18 salients loading greater than .350, and one is tempted to name this aggregation 'Sociability II'. However it is a separate factor from Factor 1 in that here the emphasis is on social withdrawal and a desire to be 'alone' and away from the bustle of crowds and excitement. This, along with the first factor reflect the popular notion of 'extraversion' yet they exist as separates. This factor has therefore been interpreted as Social Shyness and the sum of the squared column loadings equals 9.6. [10% of the variance].





Factor 4, Trust vs Suspicion (TS)

<u>Variable</u>	<u>Loading</u>	<u>Item</u>
401	.466	Male - female variable.
270	.423	I often wonder what hidden reason another person may have for doing something nice for me.
310	.421	Other people too often take the credit for things you yourself have done.
90	.410	People pretend to care more about one another than they really do.
69	.400	People today have forgotten how to feel properly ashamed of themselves.
300	.387	Most people do not respect the rights of others.
190	.363	I have been seriously slighted more than once.
148	.357	Most people think too much about sex.
130	.350	I distrust people I have just met until I get better acquainted.
318	.342	I often become bored when the topic of conversation is unrelated to my own interests.
87	.336	Are you more interested in athletics than in intellectual things?
329	.331	Far too many people try to take as much as they can, and give as little as possible back to society.
80	.314	I wish people would not unburden their troubles on me.
50	.313	I have been treated less reasonably than my good intentions deserve.
51	.310	I am a carefree individual.
89	.306	Most people keep to the "straight and narrow path" only because of their fear of being caught.
10	.309	People often say bad things about me behind my back for no good reason.
110	-.303	The number of "two faced" individuals I have known is actually very small.

This aggregation of 18 salients, greater than .300 bears a certain resemblance to the clinical-pathological dimension of 'paranoia'. In the present instance, however, 'paranoia' does not appropriately reflect the total item content. It is interesting to note that the largest salient loading on this factor is sex. This is, perhaps, indicative of a sex-based factor. This is partially borne out by looking back at the fifth matching factor of the 20 factor Varimax solution where we



observe the predominance of salients on the female Factors VIII and XV. This factor would appear to be a combination of the Trust vs Suspicion and Paranoid sensitivity factors identified by Sells, Demaree and Will (1970) and Howarth and Browne (1971a). The variance accounted for in terms of the sum of the squared column loadings is 7.5. [8% of the variance].

#### Factor 5, Impulsivity (IP)

<u>Variable</u>	<u>Loading</u>	<u>Item</u>
3	.544	I often act on the first thought that comes into my head.
263	.508	On the whole I am a rather impulsive person.
363	-.493	I rarely act without careful consideration.
43	.472	I often act on suggestions quickly without stopping to think.
163	-.464	I believe in the saying "look before you leap".
31	-.442	Other people think of me as being very serious minded.
23	.431	I seldom stop to think things over before I act.
191	-.426	Do other people regard you as a serious, sober individual?
223	-.425	I seldom make decisions on the spur of the moment.
343	.414	Do people say you sometimes behave rashly?
83	.381	I sometimes say the first thing that comes into my head.
231	-.379	I take life very seriously.
63	-.341	Uncontrolled impulsiveness is not part of my make-up.
303	.334	I seldom plan things carefully well ahead of time.
4	.333	I enjoy taking risks just for fun.
39	.332	My interests change quickly from one thing to another.
211	.329	I am a happy-go-lucky individual.
203	.315	I usually say what I feel like saying at the moment.

This salient aggregation of 18 items with loadings greater than .300 is clearly an Impulsivity factor. According to Eysenck (Eysenck



and Eysenck, 1963) this is the second major component of 'extraversion' (along with sociability). This factor was early identified by the Guilfords where they suggested that "...surely the outstanding thing about this grouping of reactions is impulsiveness; a quick and ready response to environmental changes. This has been considered by many as the sine qua non of extraversion" (Guilford and Guilford, 1934, p. 395). This factor has additionally been identified by Eysenck (Eysenck and Eysenck, 1969), and Howarth and Browne (1971b; 1971c). The sum of the squared column loadings equals 6.7. [7% of the variance].

Factor 6, Persistence, (PS)

<u>Variable</u>	<u>Loading</u>	<u>Item</u>
59	.513	I persist on a job until it is completed even when others have given up.
119	-.485	I give up easily.
306	.466	I am regarded as a very energetic person.
79	-.432	I find myself starting things and then losing interest in them.
139	.425	When perplexed by a difficult problem I keep trying to solve it.
319	-.415	If a problem is difficult I find it best to drop it.
19	.380	Whatever the difficulties I stick to my original intentions.
99	.369	I am able to work long hours without rest.
339	.363	I believe that "if at first you don't succeed, try, try again".
179	-.340	My enthusiasm for a new project does not persist.
331	-.337	I am inclined to take my work casually, that is as a matter of course.
359	-.327	It is hard for me to work intensely on a scholarly problem for more than an hour or two at a stretch.
226	.319	I often set a pace which others find hard to keep up with.
266	-.313	I am not energetic and find it difficult to keep busy.
307	.312	I enjoy thinking out complicated problems.





The most dominant characteristic running through this salient aggregation of 15 items loading greater than .300, is persistence. Much work has been devoted to the delineation and measurement of this trait. Stemming from the original work of Fernald (1912), the more important contributors have included Chapman (1924), Hartshorne, May and Maller (1929), Cattell (1933), and Eysenck (1947). The sum of the squared column loadings, for this factor, is 6.6. [7% of the variance].

Factor 7, Sex and Superego (SX/SG)

<u>Variable</u>	<u>Loading</u>	<u>Item</u>
368	.505	I approve of contemporary sexual morality.
328	.484	It is alright to read sexually suggestive literature.
308	.435	I like to talk about sex.
169	-.429	I am greatly concerned over the morals of my generation.
228	-.401	I am embarrassed by dirty stories.
49	.384	It is alright to get around the law if you don't break it.
109	.359	I have often gone against my parents' wishes.
11	.348	I believe in the idea that we should "eat, drink and be merry, for tomorrow we die".
369	-.342	I generally prefer to associate with polite rather than with rough rebellious persons.
288	-.338	I never attend a sexy show if I can avoid it.
389	-.316	I think I am more easy going about right and wrong than most people.
148	-.309	Most people think too much about sex.

This aggregation of 12 salients greater than .300 appears to represent an attitude toward contemporary sexual morality. As such this factor probably reflects directly upon the sample of university students tested. Whether this factor, representing a fusion of the putative factor hypotheses Sex (SX) and Superego (SG), is a replicable



primary to be obtained in a more diverse sample, awaits further research. The variance contribution is 5.8. [6% of the variance].

#### Factor 8, Freudian Introversion (FI)

<u>Variable</u>	<u>Loading</u>	<u>Item</u>
287	-.547	I do not keep a personal diary.
379	-.545	People do not consider me a quitter.
272	-.534	I do not have spells of hay fever or asthma.
92	-.504	I have had no difficulty starting or holding my urine.
392	-.481	I seldom have cause to alter my plans for reasons of health.
387	.478	I do not like to have time to be alone with my thoughts.
52	-.421	I don't often notice my ears ringing or buzzing.
373	-.420	I seldom throw my weight around.
280	.385	Good manners are not that important.
112	-.375	I never get attacks of shaking or trembling.
388	-.374	I do not believe that a successful marriage is based on sex.
187	.370	I do not think a great deal.
70	-.362	I do not suspect the loyalty of friends.
316	-.361	I don't believe in showing up my neighbor even if he cheats me over small matters.
317	-.360	Socially I am not considered reticent and retiring.
63	-.356	Uncontrolled impulsiveness is not part of my make-up.
336	.348	Discussion of local problems does not interest me.
230	-.322	I know of no one who would wish me harm.
21	.314	I do not enjoy meeting new people.
192	-.302	I seldom worry about my health.
237	-.300	I am not considered a shy person.

Could this salient aggregation of 21 loadings greater or equal to .300 be empirical (factorial) validation of Freud's theory of 'introversion'? Freud's theory identified 'introversion' with incipient neuroticism in that an introvert was not yet neurotic but finds himself in a labile condition; he must develop symptoms at the next dislocation of forces if he does not find other outlets for his pent-up libido



(Freud, 1920). The item content of this factor appears to reflect the flavor of the 'introversio libidinus sexualis' (Bash, 1955). Here is the parallel approach in psychiatry to that of psychology as developed in the first chapter. There is an indication from the item content as to why there is a relationship obtained in questionnaire measures between 'introversion' and 'neuroticism'. Further pursuit of this factor might bear some interesting results for future researchers. The contribution to the variance for this factor is 5.6. [6% of the variance].

Factor 9, Dominance (AD)

<u>Variable</u>	<u>Loading</u>	<u>Item</u>
253	.562	When I work on a committee I like to take charge of things.
293	.515	I like to "take command" by knowing what is best for my group.
133	.479	In group undertakings I almost feel that my plans are best.
198	.410	People say that I often try to sway the group.
213	.386	I speak out in meetings to oppose those whom I feel sure are wrong.
93	.374	I dominate many of my acquaintances of about my own age.
53	.366	I am often inclined to go out of my way to win a point with someone who has opposed me.
13	-.357	I am satisfied to let someone else take the lead in group activities.
14	.344	I am a very talkative person.
394	-.325	I am a better listener than a conversationalist.
173	.320	I like people to listen hard to what I have to say.
74	.319	I would rate myself as a talkative individual.
333	.316	People have told me I am aggressive.
393	.306	I am usually right on important matters.



Here is a well known personality trait with 14 salients loading greater than .300. This factor has been identified by Guilford (Guilford and Guilford, 1939), Cattell (1945) and more recently, Howarth and Browne (1971c) factoring the items of the EPI. Prominently used 'dominance' scales are included in the MMPI (Hathaway and McKinley, 1943) and the CPI (Gough, 1956). Goldberg (1970) refers to dominance as the 'related construct' to extraversion. The variance contribution is 5.4. [5.5% of the variance].

#### Factor 10, Unidentified

<u>Variable</u>	<u>Loading</u>	<u>Item</u>
171	.344	I always follow the rule business before pleasure.
267	.342	The thinking that I do is largely limited to that which I must do in the course of my work.
370	.312	I never question the honesty of people.
24	.310	I have never done anything dangerous for the thrill of it.
273	.304	I am easily downed in an argument.
330	.302	I have never been blamed without cause.
170	.282	I have never felt that a speaker was talking about me personally.
326	.274	I am usually too busy to spend time in reflective thoughts.
367	-.270	I have frequently found myself, when alone, pondering such abstract problems as free will, evil, etc.
387	.263	I do not like to have time to be alone with my thoughts.
352	.259	I seldom fight for what I believe is right.
147	.256	I seldom analyze the motives of others and compare their reactions with my own.
214	.250	I would rather apply for a job by writing a letter than by going for a personal interview.

There is a certain compellingness to interpret this aggregation of 13 salients, equal to or greater than .250, as 'Thinking Introver-





sion'. However, the psychological meaningfulness in the total item content aggregation is not sufficiently clear, and many of the loadings are of borderline significance. The variance accounted for equals 5.1. [5% of the variance].

Factor 11, Cooperativeness-Considerateness (CC)

<u>Variable</u>	<u>Loading</u>	<u>Item</u>
56	.349	I try to be a "Good Samaritan".
178	.308	I often inconvenience myself to oblige others.
262	.295	I quickly calm down after losing my temper.
382	.290	I most often feel in the right mood to see anyone.
367	.268	I have frequently found myself, when alone, pondering such abstract problems as free will, evil, etc.
316	.257	I don't believe in showing up my neighbour even if he cheats me over small matters.
196	.257	I easily become involved in straightening out other people's problems.
60	.251	I do what is necessary to keep harmony in a group meeting.

This salient aggregation of 8 items loading greater than .250, in terms of the total content item aggregation, connote a 'getting-alongness' and consideration for the feelings of others. Factorial studies by Sells, Demaree and Will (1970), and Howarth and Browne (1971a; 1971b) have identified factors resembling the present one. The contribution to the variance for this factor is 4.2. [4% of the variance].



Factor 12, Inferiority (IF)

<u>Variable</u>	<u>Loading</u>	<u>Item</u>
135	-.324	I usually succeed in making a favourable impression on people.
315	.311	I feel that I am not a successful person.
195	-.301	At a social event people are usually glad to meet me.
255	-.259	I am most often successful in dealing with people.
369	-.258	I generally prefer to associate with polite rather than rough rebellious persons.
235	-.250	I usually realize my personal expectations.
199	-.250	Most problems are solved if you stay at them.

Seven salients loading equal to or greater than .250 have been interpreted as 'Inferiority'. This aggregation of modest loadings depicts a profile of lack of success, failure to make favorable impressions on people, and the subjective declaration of failure to realize personal expectations. This factor has been identified in item-factor-analyses of the EPI (Eysenck and Eysenck, 1969; Howarth and Browne, 1971c). The sum of the squared column loadings for this factor equals 3.4. [3.5% of the variance].

The 12 factor combined Varimax solution is summarized below.

<u>Factor</u>	<u>Title</u>	<u>Salients</u>
1	Sociability (SY)	43
2	Adjustment-Emotionality (AE)	31
3	Social Shyness (SH)	18
4	Trust vs Suspicion (TS)	18
5	Impulsivity (IP)	18
6	Persistence (PS)	15
7	Sex and Superego (SX/SG)	12
8*	'Freudian Introversion' (FI)	21
9	Dominance (AD)	14
10	Unidentified	13
11	Cooperativeness- Considerateness (CC)	8
12	Inferiority (IF)	7



\* The possibility of this being a Hypochondriac-Medical (HM) factor is not ruled out. This may well represent a fusion of HM with other putative salients. Discussion of this factor, without being purely speculative, must await future research.

Interpretation of the 12 factors, as presented, was based on the concept of factors as descriptive dimensions that summarize the factorial content of the item domain sampled. It should have been noted that no attempt was made to 'reify' any factor or to fictitiously force a meaning on to any particular item aggregation. Interpretation and naming of the factors was done in simple, understandable terms in order to impart the pictures of the factorial dimensions as candidly as possible.

Figure 3 represents the distribution of items (from their respective original sources) loading significantly on the 12 factor Varimax solution. It is instructive to note that those questionnaires that were either constructed through factor analysis or 'verified' by factor analysis, have the best representation (Guilford, Cattell<sup>2</sup>, Eysenck, the OPI, Comrey Scales; CS, Bendig Scales; PSEI, and Howarth; HFQ2). As a factor did not appear, resembling 'Sensation Seeking', not one of Zuckerman's Sensation Seeking Scale items loaded significantly on the solution.

The item factor structure, describing the major dimensions obtaining from a pool of 400 'extraversion' and 'adjustment' items

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2. Every Cattell item was carefully re-written for formatting conformity but additionally they are factorially complex in their original form and one would not have predicted as good a representation as was obtained.





(represented by the Comprehensive Opinion Survey) resulting from the definitive 12 factor Varimax solution, may be summarized as follows: 1. Sociability (SY); 2. Adjustment-Emotionality (AE); 3. Social Shyness (SH); 4. Trust vs Suspicion (TS); 5. Impulsivity (IP); 6. Persistence (PS); 7. Sex and Superego (SX/SG); 8. Freudian Introversion (FI); 9. Dominance (AD); 10. Unidentified; 11. Cooperativeness-Considerateness (CC); 12. Inferiority (IF).

The 'Scree' test, having estimated the probability of 11 or 12 interpretable factors, appeared to be more accurate than one would have predicted for very large matrices.

With the exceptions of Sex and Superego, and Freudian Introversion, the remaining 9 primary factors may be considered stable and replicable. In addition to which Sociability, Social Shyness, Adjustment-Emotionality, Trust vs Suspicion, Persistence, Impulsivity, Dominance, and Cooperativeness-Considerateness arise as acceptable matches across sex, within the framework of the sample tested and within the factorial interpretation based upon the total item content aggregations.

The factors obtained herein are, for the most part Combinatorial factors (C-factors; i.e., factors made up of dissimilar items) rather than Tautological factors (T-factors) which consist of several repetitions of the same question<sup>3</sup>.

How do the present results bear upon the issues raised at the end of Chapter Two? It is to this consideration that we must now turn.

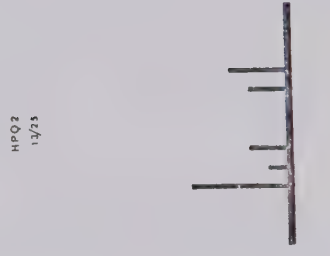
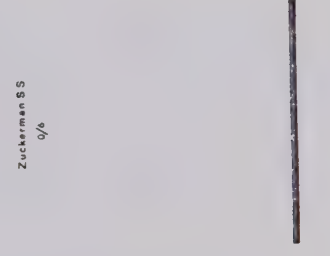
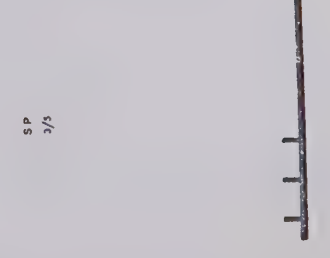
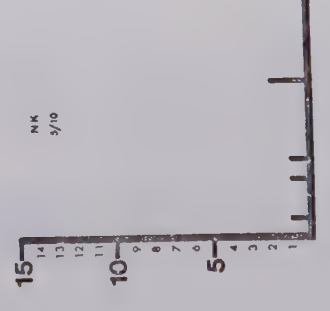
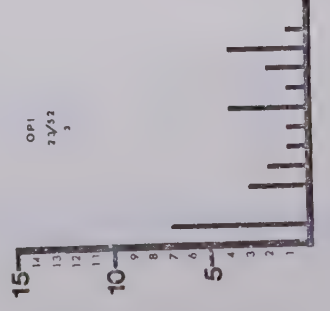
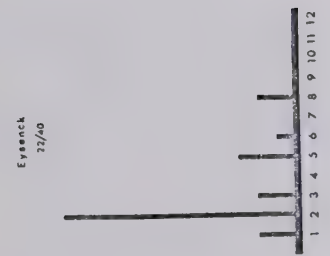
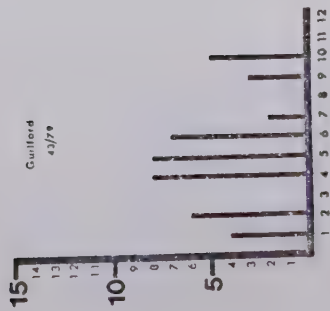
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3. See Eysenck and Eysenck (1969).



Figure 3. Distribution of items (from their respective original sources) loading significantly on the 12 factor Varimax solution. Numerals under the source, expressed as fractions, indicate the number of items loading significantly over the total number of putative items from that source. Small numerals, where present, indicate the number of items that load on more than one factor.





# Varimax Factors



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#### PART IV

#### DISCUSSION AND CONCLUSIONS



## CHAPTER SIX

## DISCUSSION AND CONCLUSIONS

"Temperament and personality are of extreme social, educational and industrial importance so that it is very necessary to devise satisfactory methods of diagnosing, estimating and measuring them, and of establishing more clearly their psychological nature" (Vernon, 1929, p. 116).

This highly relevant quotation, from Vernon, pronounced in what has been considered, in this thesis, as the early metric era, has accrued increasing meaningfulness to it with the passing years, and truly captures the spirit underlying the conceptual and methodological framework of this present study.

The use of the term 'extraversion', as we have already seen, has a very long history dating back, at least, to the 17th century. As a metric concept within the fold of psychological literature, however, the term has a very short history stemming from the post-Jungian attempts at operationalization. And although the term found a solid home in popular speech, pre-metric and early metric endeavors to define it floundered in considerable disagreement and confusion. The chaos was accentuated by writers not making adequate distinctions between Jung and Freud, and by the uncritical acceptance of the term as an existential personality dimension. One would have thought a more careful and closer study of Jung's work would have indicated to the early workers that Jung was presenting the terms 'extraversion' and 'introversion' as mechanisms, and that the notion of psychological





types was centered around the four functions: thinking, feeling, sensation, and intuition, which bear considerable similarity to those described by Plato.

The only writers to develop 'measurement instruments' along the lines of personality types advocated by Jung were the Jungians of the post WWII era whose work was insufficiently clear to have gained any general recognition as adequate operationalization of Jung's ideas.

From the post war period on, Eysenck's work appeared promising but, at the questionnaire level, he was unable to decide where 'extraversion' was located. Notions that it was a broad second-order factor were entertained by Eysenck, and later Cattell, having 'discovered' second-order factors in the questionnaire realm, came to generally support this idea in his description of a broad second-order factor which he termed 'exvia-invia'. However, we must remark that, rather than solving the problem by evoking 'higher-order' concepts to operationalize and describe 'extraversion' it served to further confuse the issue because the principal investigators (i.e., Eysenck and Cattell) could not agree on how these 'higher-order' concepts should be obtained, or what their primary factor structure should be. The crux of the issue is the identification of the primary factor structure.

Guilford's early, brilliant, work had begun the investigation of this problem, but despite this, and, in effect, jumping twenty years, Eysenck, until recently, did not have such a structure, but rather constructed his system on insecurely based hypotheses and over-reliance on the work of previous investigators. Cattell began by targeting



questionnaire results to behavior ratings which eventuated in clusters of highly complex variables and 'scales' which could not be recovered through later, critical, investigations (except by Cattell himself). This being the case, the primary factor structure, indeed the existence of such a concept as 'extraversion', at the level of questionnaire assessment, has remained unknown until recently, and has consisted of traces or 'hints' in the relevant metric literature. The present study was undertaken with these previous fragmentary clues as a background, in an attempt to definitively determine the factor structure in a widely sampled item domain.

It will now be convenient to reiterate several key issues which the present study has attempted to resolve, and to discuss them consecutively and in some detail with respect to the results obtained, pointing out the implications for future considerations.

- (1) Are primary personality factors obtainable by applying item-factor-analysis to a widely sampled item domain?
- (2) How do the factors thus obtained resemble previously discovered factors reported in the literature?
- (3) Are the factors invariant across sex?
- (4) Are the primary personality factors stable and replicable?
- (5) Can individual trait differences in personality be adequately described, for research and clinical applications, by finer categorization within the broad term 'EXTRAVERSION'?

I will now deal with these questions in turn:

1. The application of item-factor-analysis to a widely sampled item domain resulted in the interpretation and identification of a number



of primary personality factors: 1. Sociability (SY); 2. Adjustment-Emotionality (AE); 3. Social Shyness (SH); 4. Trust vs. Suspicion (TS); 5. Impulsivity (IP); 6. Persistence (PS); 7. Sex and Superego (SX/SG); 8. Freudian Introversion (FI); 9. Dominance (AD); 10. Unidentified; 11. Cooperativeness-Considerateness (CC); 12. Inferiority (IF). Identification and interpretation of these

factors as primary personality factors was based upon their total item content aggregations and their previous occurrences in the literature.

2. Most of the factors obtained, in the present study, resemble primary personality factors in the literature (with the exceptions of Sex and Superego and Freudian Introversion) historically traceable to Guilford's early factor analytic studies. Identification of the respective factors with previously identified primaries was reported, for each factor, in the previous chapter.

3. Matching of the male and female 20 factor solutions to the combined 20 factor solution resulted in 12 primary factors that appear to be generally invariant across sex: I. Sociability (SY); II. Social Shyness (SH); III. Adjustment-Emotionality (AE); IV. Mood Swings-Readjustment (MR); V. Trust vs. Suspicion (TS); VI. Persistence (PS); VII. Impulsivity (IP) VIII. Freudian Introversion (FI); IX. Dominance (AD); X. Sex and Superego (SX/SG); XI. General Activity (GA); XII. Cooperativeness-Considerateness (CC).

4. With the identification of a number of primary personality factors the most critical issue arises: Are they stable and replicable?

This issue will be dealt with in considerable detail, after which I will turn to the remaining question.





### Are Primary Personality Factors in Questionnaire Data Replicable?

It must be reiterated that, apart from our own work and recent large scale item-factor-analyses, there is no universal or general agreement, to-date, on the replicability of primary personality factors in the questionnaire domain. In factor analyses of personality variables we see a host of studies (summarized by French, 1953) using various forms of the general factor model, using various means for estimating communalities and deciding on the approximate number of factors to extract, and using various methods and criteria of rotation. These studies represent a degree of confusion and disagreement in methodological issues which has been, perhaps, the largest stumbling block to the ultimate attainment of stable and replicable primary factors. It is upon this chaos that the formulations of investigators such as Peterson (1965), and Eysenck (Eysenck, 1967; Eysenck and Eysenck, 1969) are based.

Dealing with Cattell's factor system, Peterson, after an examination of descriptive efficiency, factor extraction, factor invariance, and validity, concluded that:

Factor analyses of verbal personality measures have typically generated highly complex multidimensional structural systems. Available evidence now suggests that the most dependable dimensions drawn from conventional factor analyses of ratings and questionnaires are simple familiar dimensions of broad semantic scope. It also appears that most of the initially obscure, apparently more precise, more narrowly defined factors many investigators claim to have revealed are either trivial, artifactual, capricious, or all three (1965, p. 48).





The author also suggests that "...higher order factors should not be omitted from research..." (p. 58). The question is being begged: what kind of second-order or higher-order factors will be obtained if the primaries, upon which they depend, are 'trivial, artifactual, or capricious'?

Eysenck (1967) in maintaining a 'super factor' approach has indicated two reasons why a multifactor approach may not be a very successful choice:

In the first place, these traits are not independent but quite highly correlated, and a system of description purely in terms of correlated traits leaves out what may be the most important variable of all, namely that which underlies these correlations and gives rise to the higher-order type-level concepts of extraversion and emotionality. In the second place, it has been found that while concepts like extraversion and neuroticism are easily replicable from one investigation to another, concepts at the trait level are very elusive and very difficult to reproduce from one study to another. This is true even when the instruments used are identical, when they differ, then the outcome tends to be one of utter confusion (pp. 40-41).

More recently Eysenck (Eysenck and Eysenck, 1969) suggested that:

...primary factors are not replicable across sex for the most part, unless these factors are tautological...Similarly, primary factors are not replicable from one investigator's set of questions to another's...(p. 250).

Eysenck went on to state that "our suggestion, in brief, is that primary factors are of use not so much in aiding our psychological understanding, but rather as aids in methodology, enabling us to construct psychometrically superior scales" (p. 329).



These comments, taken in total, are very much to be contrasted with our own very recent work in which a clear picture of primary personality factors is beginning to emerge. The present study has replicated 9 primary factors which have emerged in previous studies. Howarth and Browne (1971a) replicated 8 of the clearest factors from Sells, Demaree and Will (1970) in a study designed to see whether restructured items would reappear as factors in an item-factor-analysis. Additional item-factor-analyses of the Eysenck Personality Inventory items (Eysenck and Eysenck, 1969; Howarth and Browne 1971c) and 16 PF items (Howarth and Browne, 1971b) have all produced replicable factors, and are summarized below. (See also Table 4).

<u>EPI</u>	<u>EPI</u>	<u>16 PF</u>
<u>Eysenck</u>	<u>Howarth and Browne (1971c)</u>	<u>Howarth and Browne (1971b)</u>
Mood-swings	Sociability I	Adjustment-Emotionality
Sociability	Adjustment-Emotionality	Superego
Jocularly	Inferiority	Sociability
Impulsiveness	Impulsivity	Tough vs Tendermind- edness
Sleeplessness	Mood swings - Readjust- ment	Cooperativeness- Considerateness
Inferiority	Sleep	Dominance
Quick-wittedness	Superego I	Impulsiveness
Liveliness	Jocularly	Social Shyness
Nervousness	Sociability II	Physical Prowess
Irritability	Dominance	Rhathymia
Psychosomatic	Social conversation	
Masculinity	Hypochondriac-Medical	
Uninterpretable	Superego II	
Sensitivity		

A comparison of these studies with the factors obtained in the present analysis certainly intimates the probability, indeed the existence, of primary factors with different subject populations (male and



Table 4

Studies Showing Replicated Factors:\*  
in order of descending variance contributions

HPQ	HPQ2	EPI	IPF	COS
AE	AD/SH	SYI	AE	SY
SY	TS	AE	SG	AE
SG	SY	IF	SY	SH
SH	IP	IP	TT	TS
RX	PP	MR	CC	IP
IP	AE	SlP	IP	PS
IT	GA	SGI	AD	SX/SG
CC	CC	Joc	SH	FI
GT	-	SYII	PP	AD
PP	-	AD	RA	-
GA	SGI	LieI		CC
TS	SGII	SC		IF
Gaff		HM		
RA		SGII		
PA		LieII		

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\*Guilford (personal communication, 1971) - "Your results, as well as some others, show that certain factors are stubborn and must therefore be given highest credence".





female) and different item populations. There is a major similarity, which runs through all of the studies, namely the method employed. Eysenck's study, the studies by Howarth and Browne, and the present study, all used Principle Components factoring of item-variables with Varimax rotation to orthogonal simple structure. Eysenck would disagree and would undoubtedly insist that his Promax solution be given preference but as was shown in Chapter Two, his Varimax and Promax solutions are almost identical for the first 14 factors obtained. Eysenck's notion of higher-order factoring will be deliberated later in this discussion.

A central issue to the patrimony of primary personality factors is related to the item-factor-analysis approach. The first investigators to report such an analysis, on a very large scale, were Sells, Demaree, and Will (1970). The authors extracted 23 factors from the 600x600 correlation matrix of which eighteen were rotated and interpreted. Cattell charged that "as a result of insufficient factor extraction, the present authors fell 'through the first floor straight to a second-order solution'..." (p. 406). Cattell, in commenting on the item-factoring of Howarth and Browne (personal communication, 1971) suggested that these authors were obtaining 'pre-primaries' from factoring large matrices thus failing to replicate (Howarth and Browne, 1971b) his 'factors'. Intuitively, it would seem that the notions of 'second-order' factors and 'pre-primaries' would exist in different universes of discourse. In support of the accuracy of Sells et al. factor extraction, and the solution obtained in the present study, Figure 4 is presented which demonstrates the percentage variance and



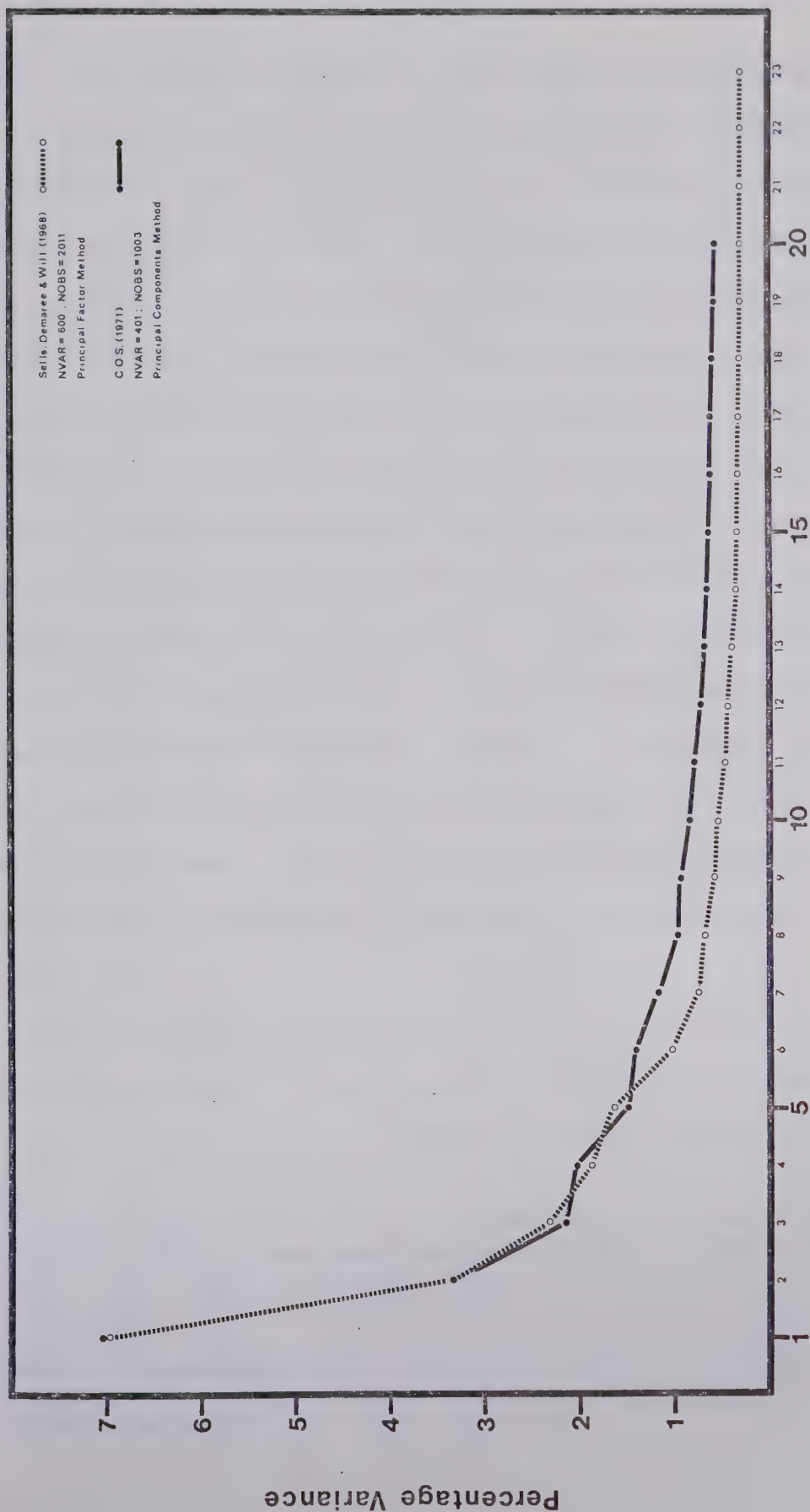
successive factors extracted for the two largest-ever item-factor-analyses done. It is further instructive to note that, in spite of different factor methods employed (Sells et al. used a Principal Factor Method with the highest correlation in the array for each variable as the diagonal value; the present study employed the Principal Components Method with unities as the diagonal values) the results are almost identical in terms of proportional variance accounted for by successive factors. This certainly serves to support the theory that with very large matrices the factorial solutions are insensitive to the diagonal values inserted in the correlation matrices. The slightly larger proportion of variance accounted for by the sixth to the twentieth factors, in the present study, is probably a reflection of the less restricted, more global item pool that was assembled.

With respect to the criticism of the number of factors extracted from very large matrix studies, since this influences the rotation and structure obtained, some comments are due. The only people who are qualified to determine the efficacy and accuracy of factor extraction in very large matrices - are those principal investigators who have, in point of fact, done such factorizations. To-date, the number of people in this category can be counted on one hand (over 200 variables in a single analysis can be regarded as a very large matrix study). Sells et al. ceased factoring at a point at which the residual variance was exhausted, and, obviously there would be no more meaningful factors to extract. In the present study cessation of factoring was determined by the number of interpretable factors obtained from the 20 factor Varimax solution, and on the guidelines suggested by the



Figure 4. Percentage variance and successive factors extracted from two very large matrices: Sells, Demaree, and Will (1970; calculations made from the 1968 monograph by the same authors), and the present study.





Successive Factors Extracted





'Scree' test. This was supported by the number of interpretable factors obtained from the 12 factor Varimax solution. Parker and Veldman (1969) did not explicitly state why they chose to rotate (Varimax) the first ten factors from their 300x300 matrix but do indicate that the seven factors they interpreted were obtained on the criterion that "all loadings with an absolute value less than 0.40 were ignored. Only seven factors remained upon which more than two items had their highest loadings" (p.606). Until shown empirically otherwise, all of these procedures must be considered acceptable. Further, the number of interpretable factors extracted from these large matrix studies are not large (18<sup>1</sup>, 11, and 7 respectively, as the size of the matrix decreases). Cattell's criticisms in terms of 'second-order' and 'pre-primary' factors are, hopefully, based on lack of experience in very large scale factoring, and more particularly item-factor-analyses. (Cattell, at one time, was an advocate of item-factor-analysis in the proper construction of questionnaires; Cattell and Coan, 1958).

The answer to the fourth point - are primary personality factors stable and replicable? - can be stated thus: predicated upon comprehensive populations of items, which must be carefully chosen from previous

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1. Several of Sells et al. 18 factors proved difficult to interpret. By plotting the eigenvalues from Sells study and applying the 'Scree' test Professor Howarth suggests that there are "11 or 12 if the first 'Scree' is adopted, and 15 or 16 if the second 'Scree' is adopted...Cattell generally recommends the first 'Scree'". He further believes that Sells would have obtained a more definitive solution by (a) using Varimax not Promax, (b) concentrating on a 12-factor solution.



studies, reworded for consistency, and provided with a simple and unambiguous answer scale; by using such items in large matrices, with a factor model such as Principal Components and ample subject populations; by utilizing an analytical rotation program for orthogonal simple structure, such as Varimax, paying adequate concern for the item loadings in such large matrices, and by attempting to pinpoint the desirable number of factors, neither under nor over extracting; primary factors will be found which are replicable and worthy of study. It is, in turn believed, that a true multivariate approach to personality dimensions will be based on these primary factors which are too important, for the clinician and researcher, to be collected together as 'secondaries', and that adequate theory will develop when these primaries have been identified.

Before turning to the fifth point I will discuss (a) obliquity and (b) Fission-Fusion as these issues apply generally to most of the previous points discussed.

#### 'Obliquity' and higher-order 'factors'

It may be objected that the present study, as primarily an 'extraversion' study, did not utilize 'oblique' rotation with the supposed advantage of carrying out higher-order analyses, where supposedly, this shadow, named 'extraversion', has been reported to dwell. Support is not lacking for the theory of obliquity, as a 'natural' occurrence.

...I have put forward arguments for believing that simple structure is inherent in natural data and that, when it is discovered, and



exactly adhered to, it normally yields oblique factors (Cattell, 1965, p. 224).

But isn't this really more philosophical than realistic? There have been numerous demonstrations that oblique and orthogonal factorizations lead to essentially the same conclusions about the number and kinds of factors inherent in a particular matrix of correlations (Nunnally, 1965). Commonly occurring 'natural' personality traits can be grouped, and have been grouped, a priori, into such categories as 'sociable willingness', 'adjustment-emotionality', 'superego', and 'dominance' (Howarth, 1969). Similarly, Vernon(1964) reported "...one of the earliest attempts to make a comprehensive psychometric study of personality" (p.183) carried out in 1929-30, in which he established 'trait-composites' for sociability, dominance, emotionality, impulsiveness, and a number of other traits. These traits have been determined factorially in numerous studies, previously cited, using orthogonal simple structure criteria. Burt's formulations of a hierarchical concept of ability structure in man, which set the stage for the exploration of factor structures, held that the purpose of factor analysis was classification, and that, in the cognitive sphere particularly, the arrangement of factors obtained by principal axes often gives not only a more economical but a truer picture of mental abilities than do oblique factor methods (Burt, 1940; 1948)<sup>2</sup>. Yet the only, seeming, utility of oblique transformation is related to the ultimate attainment of 'higher-order' factors.

The question that must be faced here is: do we gain any additional

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2. The writer is indebted to Sir Cyril Burt for having received from him a number of invaluable original articles, some well-worn with use.





psychological knowledge by moving further and further away from the basic data (e.g., the item factor structure) through adopting personality dimensions based on 'Super Factor' theories?

It would appear from Eysenck's early factor work (Eysenck, 1944; 1947) that he assumed very broad primary factors to be the same as 'second-order' factors. This is borne out by his contention that he had factorially determined 'extraversion' as the second large bi-polar primary factor (hysteria-dysthymia) in a study with neurotic soldiers. More recently he has continued this practice by reporting on the two first unrotated principal axes factors as being similar to his two 'Super Factors', neuroticism and extraversion (Eysenck and Eysenck, 1969). Yet Eysenck explicitly and emphatically states "If these exist they can be derived only from the observed intercorrelations between the primary traits...(1969, p. 32)<sup>3</sup>

In order to determine the item factor structure of his 'Super Factors' Eysenck (same study as above) performed (in addition to a Varimax solution) first, second, and third-order Promax solutions, and at the third-order level identified his 'extraversion' factor as a composite of the second and fourth Promax factors, Sociability and Jocularly, respectively. The following displays the item salient aggregations on these two factors and compares them to the item salient aggregations obtained from his second and third primary Varimax factors, which Eysenck very much plays down. All items are reproduced in the

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3. In his 1963 study graphical orthogonal rotation was employed and identified sociability and impulsivity as co-partners in 'extraversion' (Eysenck and Eysenck, 1963).



exact order in which Eysenck obtained and reported them.

Sociability, 3rd Order Promax, Factor 2.

<u>Variable</u>	<u>Item</u>
7	Hate having to introduce people to each other
29	Like mixing with people
33	Prefer reading to meeting people
95	Usually keep 'yourself to yourself' except with very close friends
41	Like going out a lot
65	Most quiet when you are with other people

Jocularity, 3rd Order Promax, Factor 4.

<u>Variable</u>	<u>Item</u>
105	Like cracking jokes and telling funny stories to your friends
53	Like practical jokes
77	Hate being with a crowd who play jokes on one another
101	Like playing pranks on others

Sociability, 1st Order Varimax, Factor 2.

<u>Variable</u>	<u>Item</u>
49	Usually let yourself go and enjoy yourself a lot at a gay party
93	Find it hard to really enjoy yourself at a lively party
37	Usually stay in the background at parties and 'get togethers'
33	Prefer reading to meeting people



- 41        Like going out a lot
- 65        Mostly quiet when you are with other people

Jocularinity, 1st Order Varimax, Factor 3.

<u>Variable</u>	<u>Item</u>
53	Like practical jokes
101	Like playing pranks on others
77	Hate being with a crowd who play jokes on one another
105	Like cracking jokes and telling funny stories to your friends

It is immediately apparent that the interpretations of these factors, based on the total item content aggregations is highly similar. Of far greater import, however, is the fact that, with the exception of three Sociability items ALL other items in Sociability and Jocularinity are IDENTICAL! What has been gained by evoking a theory of 'Super Factors' (e.g. 'extraversion') when the same factors exist in the multivariate primary array? The answer is, of course, NOTHING. What has been lost? Every other primary trait dimension that enters into the description of multidimensional personality. What has happened to Impulsivity, the supposed co-factor to Sociability in making-up 'extraversion' (Eysenck and Eysenck, 1963)?

With this background one is bound to conclude that notions of coercing valuable and psychologically meaningful primary personality factors into 'higher-order' factors, is largely a fallacious procedure, on psychological grounds, and not an agreed upon procedure factor-analytically.



Our comments will undoubtedly remind the reader of the similar conclusions of Carrigan (1960) that:

...the unidimensionality of extraversion-introversion has not been conclusively demonstrated (p. 355).  
 ...and the status of extraversion-introversion as a dimension of personality thus remains somewhat tenuous (p. 357).

In this connection Professor Heron, with reference to his scale (Heron, 1956), in a personal communication with this writer (April, 1970) commented that:

The score on this part has always been termed 'sociability' rather than 'extraversion', because I have remained convinced that Eysenck's use of the latter term is unjustified when applied to an inventory score alone, based on items of this kind. In the hierarchical approach adopted by Eysenck (along with most British users of factor analysis, including myself) the contributions of the traits upon which the first-order factors are based is all too often overlooked. The variegated nature of the sources of variance contributing to Eysenck's original factor identification in Dimensions of Personality or Structure of Human Personality is no longer present when one is using an inventory such as this or the MPI as the sole measure. We are in fact back to Guilford and the 1930's.

In view of all these considerations, I ask again: Why this continuous pursuit of higher-order factors? A possible reason is that Eysenck and Cattell have supposed that cross-media matches might be more readily obtained between questionnaire secondary measures and objective primary factors. With this kind of alignment personality measurement would, of course be more solidly grounded with an experimental-laboratory basis. There is very recent evidence to suggest however, that stable primary factors may actually do a better job as





predictors for experimental-laboratory tests than Eysenckian (or Cattellian) secondary Q factors.

In two recent and unpublished cross-media studies (CMSI and R. Hanna's masters thesis)<sup>4</sup> the efficacy of primaries and secondaries (Q data) was compared. In both independent studies the primaries did at least as good a job of predicting laboratory measures as the secondaries, and in the latter study, did a better job. These findings are opposed to a fairly widely held view that cross-media relationships will be most easily found between questionnaire secondaries and laboratory (or physiological) measures. This may well be true in the case of poorly designed primaries - as in Cattell's 16 PF - or in the measures which purport to go straight into secondaries as in Eysenck's EPI - but it should by no means be assumed to be a general rule. Quite the opposite, in fact, may eventually prove to be the case i.e., with adequately measured primaries, especially on the basis of orthogonal factor solutions, primaries may be better at prediction than (putative) secondaries. If this proves to be true, it will remove one of the basic assumptions of the oblique solution advocates (with the corollary technique of secondary and tertiary factoring) and lead to the general acceptance of an adequate primary factor system for future cross-media and multiple regression studies.

#### Fission-Fusion of the Putative Factor Hypotheses.

It is now relevant to discuss an observation in the large scale

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4. Hanna, R. Genetic markers and personality traits. U. of A. August 1971.



item-factoring of a marker domain in which the items were originally grouped into putative factor hypotheses, in order to show that a priori assumptions that items 'appear' to be putative measures of certain traits, upon which so many early inventories were based, may be, in some cases, unjustified. (We, of course had realized this in advance from our consideration of so many extant studies in the literature in which scales were constructed by the 'eyeball' method).

Considering the respective factors extracted in accord with the principles of orthogonal simple structure, it can be seen that as the contributions to the variance decrease there is a tendency for a progressive swing from possible fusion of the putative factors, to fission. An excellent example of a fusion factor is the second factor in the 12 factor Varimax that has here been interpreted as Adjustment-Emotionality (AE). If we compare this factor to the 20 factor Varimax solution it can be seen that in the 12 factor solution we have a fusing of Adjustment-Emotionality with what was previously a separate identifiable factor Mood Swings-Readjustment (MR).

An example of factor fission is readily observed for Sex (SX) a putative factor which in the analysis was split among several others, but this factor also shows a fusion with Superego (SG). However, in most factors, such as Impulsivity (IP) and Persistence (PS), very little fission-fusion has occurred with respect to the putative factors under which the putative items were originally grouped. In this manner, 12 of the putative IP items are salients on the IP factor, while 10 of the 20 putative PS items are salients on the factor interpreted as PS.



This brings us to the eighth factor which is an excellent example of fission and was named 'Freudian Introversion', and which comprises items from 11 putative 'factors'. The 21 salients represent: Hypochondriac-Medical (HM), 6 salients; Thinking Introversion (TI), 3 salients; Social Shyness (SH), 2 salients; Paranoia (PA) 2 salients; Social Responsibility (SR), 2 salients; Persistence (PS), Dominance (AD), Cooperativeness-Considerateness (CC), Sex (SX), Impulsivity (IP), and Sociability (SY), all of which contributed one salient to the total item aggregation<sup>5</sup>. If the interpretation of this factor was done in terms of the frequency of salients alone, it would have been interpreted as Hypochondriac-Medical. However in terms of the total item content aggregation, upon which the interpretation of a factor must be based, careful attention must be paid to the additional 15 salients which aggregate on the factor.

The importance of the observed fission-fusion of putative markers must not be underestimated and points to the pressing need for critically re-examining existing inventories which have not been based on item-factoring (e.g., 16 PF, MMPI, CPI, OPI). An examination of the results obtained by Sells, Demaree and Will (1970), and Howarth and Browne (1971b), particularly in regard to Cattell's 'scales' is empirical validation of this contention. If scales are developed by packaging putative items without regard to the multiple relationships outside the packages, then item-factor-analysis will produce a fission-fusion of the original crude packages resulting in a very different

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5. This is a good example of what Eysenck terms a Combinatorial or C-factor.





(but genuine) factor structure. Item-factor-analysis is, therefore, clearly vital for the initial description of the factors to be used as scales on personality (and other) inventories (e.g. intelligence, aptitude, interest).

5. Turning to the fifth point, attempts to 'reify' 'extraversion' have not generally been successful. At the questionnaire level it now appears that the personality 'dimension', called 'extraversion', is nothing more than a name applied to a varying composite of primary personality traits (e.g., sociability, adjustment and impulsivity; Guilford and Guilford, 1934; sociability; Bendig, 1962; Eysenck and Eysenck, 1967; sociability and impulsivity; Eysenck and Eysenck, 1963; sociability and jocularity; Eysenck and Eysenck, 1969; Affectothymia, Surgency, Parmia, Self-sufficiency, and Dominance; Cattell, 1965) variously isolated in these studies (by restricted item pools and methodology), so that it now becomes much clearer why early theorists and researchers have so persistently ended up in confusion and disagreement, because from the beginning it had been assumed that Jung was presenting extraversion and introversion as a typological personality dimension<sup>6</sup>, resulting in a scramble to develop 'measures' for this 'dimension'. Positive results were, however, not easily obtainable because the investigators were attempting to measure a name - not a 'dimension of personality' at the questionnaire level. It is the contention here that the term 'extraversion' by being originally

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6. Burt (1939) as an example: "Jung...has proposed the very convenient terms 'extravert' and 'introvert'...therefore, I venture to borrow his terms" (p. 287).



misconstrued, thereby persisted as an artifactual dimension at the questionnaire level due to its almost unprecedented popularity and use in common speech.

Extraversion, as an embracing term, may still however have a place, closer to that for which it was originally intended and that is in the dynamics of neurophysiological psychology, as an embracing mechanism. In this regard, it may be equivalent to 'primary and secondary functioning', 'erethytic and kolytic', 'excitation and inhibition', 'strong and weak nervous system', and 'cortertia' (Cattell's acronym for cortical alertness) etc. In short, a function of the central and/or autonomic nervous system which regulates all behavior.<sup>6a</sup>

The categorization of individual trait differences in personality is dependent upon the identification and establishment of stable and replicable primary trait dimensions which have been obfuscated by appealing to the very broad notion of 'extraversion'. The 'lumping' of individuals into an arbitrarily defined category obscures the very nature of individual differences and at the same time renders their measurement impossible. Moreover, considering 'extraversion' to be 'sociability and impulsiveness' or 'sociability and jocularity' as Eysenck does, denies the more encompassing multivariate nature of individual differences in the personality trait dimensions, and attempts to define them in a restricted (non-existent) space. The quandary of innumerable inventories, mostly of poor construction, has made clinicians and counsellors, in many instances, skeptical of the

<sup>6a</sup> Viewed in this respect, Eysenck's work, in linking his theory to the Pavlovian concepts of 'strength of the nervous system', is very promising.



possibility of the individual trait dimensions<sup>7</sup> (which are, potentially, of such great importance for obtaining multivariate trait profiles of individual differences). The direction indicated for the future is for these clinicians and counsellors to have available for their use inventories which have been proven to include only the stable and replicable traits established through the adequate procedures of item-factor-analysis.

#### The Need For Item-Factored Personality Inventories.

The recent work of Eysenck and Eysenck (1969), Sells, Demaree and Will (1970), and Howarth and Browne (1971b; 1971c), has clearly shown the importance of subjecting existing personality inventories to item-factor-analysis, and to looking to the future for inventories that have been based, from the beginning, on this method. The need for adequate assessment instruments upon which accurate trait profiles can be developed, for use by counsellors, clinical psychologists, and in personnel selection, cannot be understated.

The most authoritative compendium of personality tests ever assembled is Buros (1970) in which he states:

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7. An excellent early example of this is Ellis (1946) in which the author concluded that "...group-administered paper and pencil personality questionnaires are of dubious value in distinguishing between groups of adjusted and maladjusted individuals, and that they are of much less value in the diagnosis of individual adjustment or personality traits" (p. 426). Later, however, Vernon (1953) was to strike a much brighter note "...paper-and-pencil personality tests, and questionnaires should not be entirely condemned. Well-constructed ones, given under suitable motivating conditions, can be of value both for experimental research, and in clinical or other applied psychological work" (p. 143).





In this era of remarkable progress in science and technology, it is sobering to think that our most widely used instruments for personality assessment were published 20, 30, 40 and even more years ago. Despite the tremendous amount of research devoted to these old, widely used tests, they have not been replaced by instruments more acceptable to the profession. Nor has the research resulted in a consensus among psychologists concerning the validities of a particular test. The vast literature of personality testing has failed to produce a body of knowledge generally acceptable to psychologists. In fact, all personality instruments may be described as controversial, each with its own following of devotees (p. xxv).

The 16 PF is among the leading five personality test instruments in current use, yet in spite of its current prominence this test has, until recently, been subject to relatively few critical examinations. Sells et al. have demonstrated how destructive item-factor-analysis is to factor scales such as those contained in the 16 PF, and this was further substantiated by Howarth and Browne (1971b) in which not a single factor identifiable as Cattell's was obtained through a critical item-factor-analysis.

Commenting on Cattell and Guilford's work, Eysenck (Eysenck and Eysenck, 1969) has suggested that:

The outstanding fact about such systems as those of Cattell and Guilford is not that they are objective, and based on correlation and factor analysis, but they are subjective, and based on arbitrary and intuitive judgements ...At no time did either he (Guilford) or Cattell intercorrelate all the items in his scales in one single analysis, to establish the fact that the postulated factors did in fact exist, and emerge with the correct items having high loadings on these and only these factors (pp. 326-327).





On the other hand, the Eysenck Personality Inventory, which had been constructed on the basis of item-factoring a matrix of 128x128 inter-item correlations (Eysenck and Eysenck, 1964), produced a number of identifiable, replicable primary factors, when subjected to item-factor-analysis (Eysenck and Eysenck, 1969; Howarth and Browne, 1971c). However, the inherent limitations of the Eysenck Personality Inventory, which concern basically the selection of items from a restricted set of Guilford scales, cannot be easily overcome.

Based partly on all of the previous item-factor-analyses, as presented in the body of this manuscript, and weighing largely on the results obtained from the present study, a ten factor inventory with 12 items per factor has been constructed, using only those highly replicable and stable factors identified, and the origin of which is traceable to the excellent pioneering studies carried out so many years ago by the Guilfords'. The Personality Factor Inventory (PFI; Howarth and Browne, 1971d) will undergo several critical investigations on diverse samples of students, armed forces, matched 'normals' and 'neurotics', and in addition, a form has recently been translated into French for administration to French-Canadian populations<sup>8</sup>. Results of such research with the PFI will be reported in the appropriate academic literature at which time the description and identification of the 10 factors will be presented.

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8. A French-Canadian member of the Howarth Group, M. Roger Marceau, is administering this translated form at French universities in Eastern Canada Fall 1971.



## CONCLUSIONS.

A number of conclusions may be drawn from the present study which will be appropriately presented in point form.

- (1) Item-factor-analysis is a successful and highly useful research procedure for exploring personality item domains.
- (2) Upon the premises laid down in the discussion, stable and replicable primary personality factors will be obtained, following which adequate theory will develop.
- (3) Stable, replicable primary personality factors are far too important for clinical and research applications to be coalesced into broader and more obscure secondary and tertiary 'factors'.
- (4) 'Extraversion', as a personality dimension in the questionnaire realm is a fiction which might be more appropriately conceived as an all embracing mechanism, and hence, assessed at the objective laboratory level.
- (5) It is of extreme urgency and importance that existing personality questionnaire instruments should be critically re-assessed by item-factor-analytic procedures to ascertain their true factor structure.
- (6) The pressing need for the future thus clearly lies in the development of new inventories which include only stable and replicable primary personality factors which have been solidly based through the item-factor-analyses of global item pools and tested on large and diverse subject samples.
- (7) "It seems then that the trait cannot be disowned; it is an ubiquitous component of the concrete phenomena with which the social



and applied psychologists have to deal. Let us face the facts and do the best we can to salvage it for use in a systematic psychology of personality" (Vernon, 1933, p. 535).

(8) An understanding of chemistry is sought in the multiplicity of organic structure - an understanding of personality should be sought in the multiplicity of behaviors manifest in replicable primary trait-dimension profiles.





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"Many receive advice, only the wise profit by it."

Syrus



## APPENDIX





## COMPREHENSIVE OPINION SURVEY (COS)

Instructions for Administration

In order to standardize the administration of this questionnaire at participating universities across Canada, these general and specific points are provided:

General

1. A complete set of envelopes (N = ) is enclosed for the Head of Department or designated person. Each envelope contains Form A and Form B of COS.
2. The completed sets should be returned IN ONE BATCH to:

Professor E. Howarth  
Department of Psychology  
University of Alberta  
Edmonton 7, Alberta

Specific

3. All subjects should be young adult volunteers in first or second year programs.
4. Administration will be in groups (minimum of 50, maximum of 100).
5. At the beginning of the session make sure that the instructions on the COS cover sheet are read by each subject and understood.
6. Testing should be carried out within two one hour sessions, separated by at least one day.
7. All subjects are to complete Form A first, in the first session, and Form B, in the second session.
8. It is important to ensure that the requisite details are entered on the envelope and on the cover of each booklet.
9. Use of pen or pencil is permitted.



# COMPREHENSIVE OPINION SURVEY

## FORM A

Full Name: ..... Age: .....yr. ....m.  
(Surname) (Given Names)

Institution: ..... Sex: ☐ M ☐ F  
(check one)

This booklet contains a series of statements covering a comprehensive range of adult opinions, attitudes and interests. There are 200 statements. Answer each one carefully as it best applies to you. There are no right or wrong answers, each individual answering the survey should express his or her own feelings. It is important to answer ACCURATELY and TRUTHFULLY.

Answer 'YES' or 'NO' in the space provided for each answer, and please note the indicated arrangement of the answer columns on each page.

IT IS IMPORTANT THAT EVERY STATEMENT BE ANSWERED.

Prepared by:

Edgar Howarth and James A. Browne  
The University of Alberta



	(check one)	
	YES	NO
1. At a party I like to meet as many people as I can.	1. <input type="checkbox"/>	<input type="checkbox"/>
2. My mood is unaffected by weather changes.	2. <input type="checkbox"/>	<input type="checkbox"/>
3. I often act on the first thought that comes into my head.	3. <input type="checkbox"/>	<input type="checkbox"/>
4. I enjoy taking risks just for fun.	4. <input type="checkbox"/>	<input type="checkbox"/>
5. Do ideas run through your head so that you cannot sleep?	5. <input type="checkbox"/>	<input type="checkbox"/>
6. I am always "on the go".	6. <input type="checkbox"/>	<input type="checkbox"/>
7. I am more realistic than idealistic, that is, more occupied with things as they are than with things as they should be.	7. <input type="checkbox"/>	<input type="checkbox"/>
8. I like to talk about sex.	8. <input type="checkbox"/>	<input type="checkbox"/>
9. Do you feel uncomfortable in anything but everyday clothes?	9. <input type="checkbox"/>	<input type="checkbox"/>
10. People often say bad things about me behind my back for no good reason.	10. <input type="checkbox"/>	<input type="checkbox"/>
11. I believe in the idea that we should "eat, drink and be merry, for tomorrow we die".	11. <input type="checkbox"/>	<input type="checkbox"/>
12. I am troubled by unusual fears or distastes.	12. <input type="checkbox"/>	<input type="checkbox"/>
13. I am satisfied to let someone else take the lead in group activities.	13. <input type="checkbox"/>	<input type="checkbox"/>
14. I am a very talkative person.	14. <input type="checkbox"/>	<input type="checkbox"/>
15. I am anxious about people but I don't feel close to them.	15. <input type="checkbox"/>	<input type="checkbox"/>
16. It is difficult for me to take people seriously.	16. <input type="checkbox"/>	<input type="checkbox"/>
17. I do not introduce myself to strangers at a social gathering.	17. <input type="checkbox"/>	<input type="checkbox"/>
18. Noisy people around me do not bother me while I am working.	18. <input type="checkbox"/>	<input type="checkbox"/>
19. Whatever the difficulties I stick to my original intentions.	19. <input type="checkbox"/>	<input type="checkbox"/>
20. It amuses me to see the dignity of the "establishment" being upset.	20. <input type="checkbox"/>	<input type="checkbox"/>
21. I do not enjoy meeting new people.	21. <input type="checkbox"/>	<input type="checkbox"/>
22. I often feel "just miserable" for no good reason.	22. <input type="checkbox"/>	<input type="checkbox"/>
23. I seldom stop to think things over before I act.	23. <input type="checkbox"/>	<input type="checkbox"/>
24. I have never done anything dangerous for the thrill of it.	24. <input type="checkbox"/>	<input type="checkbox"/>
25. I usually feel well rested when I get up in the morning.	25. <input type="checkbox"/>	<input type="checkbox"/>

(TURN PAGE NOTING YES - NO ANSWER COLUMN REVERSAL)

## (NOTE YES - NO ANSWER COLUMN REVERSAL)

(check one)

NO YES

- |   |     |                          |                          |
|---|-----|--------------------------|--------------------------|
| 26. I rush from one activity to another without pausing enough for rest.  | 26. | <input type="checkbox"/> | <input type="checkbox"/> |
| 27. I prefer a job that requires decision making rather than routine answers.   | 27. | <input type="checkbox"/> | <input type="checkbox"/> |
| 28. I do not discuss embarrassing subjects with the opposite sex.   | 28. | <input type="checkbox"/> | <input type="checkbox"/> |
| 29. My sense of responsibility has been questioned by some people.  | 29. | <input type="checkbox"/> | <input type="checkbox"/> |
| 30. I do not believe that most people use politeness to cover up what is really "cut throat" competition.                                   | 30. | <input type="checkbox"/> | <input type="checkbox"/> |
| 31. Other people think of me as being very serious minded.  | 31. | <input type="checkbox"/> | <input type="checkbox"/> |
| 32. I am usually free from worry about possible misfortunes.  | 32. | <input type="checkbox"/> | <input type="checkbox"/> |
| 33. If I hold an opinion that is different from that expressed by a lecturer, I am likely to tell him about it during or after the lecture. | 33. | <input type="checkbox"/> | <input type="checkbox"/> |
| 34. When I am with someone else it is easy for me to find something to talk about.  | 34. | <input type="checkbox"/> | <input type="checkbox"/> |
| 35. It does not bother me that I am not better looking.   | 35. | <input type="checkbox"/> | <input type="checkbox"/> |
| 36. I am aroused by a speaker's description of unfortunate conditions in a locality or country.   | 36. | <input type="checkbox"/> | <input type="checkbox"/> |
| 37. I find it easy to act naturally at a party.   | 37. | <input type="checkbox"/> | <input type="checkbox"/> |
| 38. I prefer working alone to working in a group.   | 38. | <input type="checkbox"/> | <input type="checkbox"/> |
| 39. My interests change quickly from one thing to another.  | 39. | <input type="checkbox"/> | <input type="checkbox"/> |
| 40. I believe that if you help others they will help you.   | 40. | <input type="checkbox"/> | <input type="checkbox"/> |
| 41. I am inclined to limit my acquaintances to a select few.  | 41. | <input type="checkbox"/> | <input type="checkbox"/> |
| 42. I am easily "rattled" and upset.  | 42. | <input type="checkbox"/> | <input type="checkbox"/> |
| 43. I often act on suggestions quickly, without stopping to think.  | 43. | <input type="checkbox"/> | <input type="checkbox"/> |
| 44. I enjoy the excitement of a crowd.  | 44. | <input type="checkbox"/> | <input type="checkbox"/> |
| 45. Have you often lost sleep over your worries?  | 45. | <input type="checkbox"/> | <input type="checkbox"/> |
| 46. I often wonder where other people get so much energy.   | 46. | <input type="checkbox"/> | <input type="checkbox"/> |
| 47. I learn more by reading than from group discussion.   | 47. | <input type="checkbox"/> | <input type="checkbox"/> |
| 48. Do you blush easily?  | 48. | <input type="checkbox"/> | <input type="checkbox"/> |
| 49. It is all right to get around the law if you don't break it.  | 49. | <input type="checkbox"/> | <input type="checkbox"/> |
| 50. I have been treated less reasonably than my good intentions deserve.  | 50. | <input type="checkbox"/> | <input type="checkbox"/> |

(TURN PAGE NOTING YES - NO ANSWER COLUMN REVERSAL)



		(check one)	
(NOTE YES - NO ANSWER COLUMN REVERSAL)		YES	NO
51. I am a carefree individual.	51.	<input type="checkbox"/>	<input type="checkbox"/>
52. I don't often notice my ears ringing or buzzing.	52.	<input type="checkbox"/>	<input type="checkbox"/>
53. I am often inclined to go out of my way to win a point with someone who has opposed me.	53.	<input type="checkbox"/>	<input type="checkbox"/>
54. In a group of people I keep quiet.	54.	<input type="checkbox"/>	<input type="checkbox"/>
55. I sometimes find it hard to stick up for my rights because I am so reserved.	55.	<input type="checkbox"/>	<input type="checkbox"/>
56. I try to be a "Good Samaritan".	56.	<input type="checkbox"/>	<input type="checkbox"/>
57. At times, I have to fight against bashfulness.	57.	<input type="checkbox"/>	<input type="checkbox"/>
58. I readily associate with people holding views opposed to my own.	58.	<input type="checkbox"/>	<input type="checkbox"/>
59. I persist on a job until it is completed even when others have given up.	59.	<input type="checkbox"/>	<input type="checkbox"/>
60. I do what is necessary to keep harmony in a group meeting.	60.	<input type="checkbox"/>	<input type="checkbox"/>
61. I am a good social mixer.	61.	<input type="checkbox"/>	<input type="checkbox"/>
62. I am inclined to be moody.	62.	<input type="checkbox"/>	<input type="checkbox"/>
63. Uncontrolled impulsiveness is not part of my make-up.	63.	<input type="checkbox"/>	<input type="checkbox"/>
64. I dislike doing things that are a little frightening.	64.	<input type="checkbox"/>	<input type="checkbox"/>
65. I do not have nightmares.	65.	<input type="checkbox"/>	<input type="checkbox"/>
66. Physical work tires me more rapidly than most people.	66.	<input type="checkbox"/>	<input type="checkbox"/>
67. You frequently find yourself in a meditative state.	67.	<input type="checkbox"/>	<input type="checkbox"/>
68. I am well at ease with members of the opposite sex.	68.	<input type="checkbox"/>	<input type="checkbox"/>
69. People today have forgotten how to feel properly ashamed of themselves.	69.	<input type="checkbox"/>	<input type="checkbox"/>
70. I do not suspect the loyalty of friends.	70.	<input type="checkbox"/>	<input type="checkbox"/>
71. I seldom let my responsibilities interfere with having a good time.	71.	<input type="checkbox"/>	<input type="checkbox"/>
72. Occasionally I do not feel like doing something although I had planned and looked forward to it.	72.	<input type="checkbox"/>	<input type="checkbox"/>
73. I get little satisfaction from making other people do as I want them to.	73.	<input type="checkbox"/>	<input type="checkbox"/>
74. I would rate myself as a talkative individual.	74.	<input type="checkbox"/>	<input type="checkbox"/>
75. I am troubled by inferiority feelings.	75.	<input type="checkbox"/>	<input type="checkbox"/>

(TURN PAGE NOTING YES - NO ANSWER COLUMN REVERSAL)

(NOTE YES - NO ANSWER COLUMN REVERSAL)		(check one)	
		NO	YES
76. I would rather remain free from commitments to others than risk serious disappointments or failure later.	76.	<input type="checkbox"/>	<input type="checkbox"/>
77. I like to meet with people socially.	77.	<input type="checkbox"/>	<input type="checkbox"/>
78. I do not like to be watched by others while I am working.	78.	<input type="checkbox"/>	<input type="checkbox"/>
79. I find myself starting things and then losing interest in them.	79.	<input type="checkbox"/>	<input type="checkbox"/>
80. I wish people would not unburden their troubles on me.	80.	<input type="checkbox"/>	<input type="checkbox"/>
81. I usually take the initiative in making new friends.	81.	<input type="checkbox"/>	<input type="checkbox"/>
82. I am regarded as a solid person who is undisturbed by difficult circumstances.	82.	<input type="checkbox"/>	<input type="checkbox"/>
83. I sometimes say the first thing that comes into my head.	83.	<input type="checkbox"/>	<input type="checkbox"/>
84. At a sporting event I am often aroused to wild enthusiasm.	84.	<input type="checkbox"/>	<input type="checkbox"/>
85. Have you ever been bothered by having a useless thought come into your mind repeatedly?	85.	<input type="checkbox"/>	<input type="checkbox"/>
86. It is hard to understand why many people are so slow and get so little done.	86.	<input type="checkbox"/>	<input type="checkbox"/>
87. Are you more interested in athletics than in intellectual things?	87.	<input type="checkbox"/>	<input type="checkbox"/>
88. Many of my dreams are about sex.	88.	<input type="checkbox"/>	<input type="checkbox"/>
89. Most people keep to the "straight and narrow path" only because of their fear of being caught.	89.	<input type="checkbox"/>	<input type="checkbox"/>
90. People pretend to care more about one another than they really do.	90.	<input type="checkbox"/>	<input type="checkbox"/>
91. Many of my friends think I take my work too seriously.	91.	<input type="checkbox"/>	<input type="checkbox"/>
92. I have had no difficulty starting or holding my urine.	92.	<input type="checkbox"/>	<input type="checkbox"/>
93. I dominate many of my acquaintances of about my own age.	93.	<input type="checkbox"/>	<input type="checkbox"/>
94. I find it difficult to talk with a person I have just met.	94.	<input type="checkbox"/>	<input type="checkbox"/>
95. Being with superiors doesn't make me self-conscious.	95.	<input type="checkbox"/>	<input type="checkbox"/>
96. I am interested in a club or social group.	96.	<input type="checkbox"/>	<input type="checkbox"/>
97. I readily introduce myself when thrown by chance with a stranger.	97.	<input type="checkbox"/>	<input type="checkbox"/>
98. I feel that nice people outnumber objectionable people.	98.	<input type="checkbox"/>	<input type="checkbox"/>
99. I am able to work long hours without rest.	99.	<input type="checkbox"/>	<input type="checkbox"/>
100. When people are unreasonable I just keep quiet.	100.	<input type="checkbox"/>	<input type="checkbox"/>

(TURN PAGE NOTING YES - NO ANSWER COLUMN REVERSAL)

(NOTE YES - NO ANSWER COLUMN REVERSAL)

(check one)

YES NO

- |  |      |                          |                          |
|--|------|--------------------------|--------------------------|
| 101. I would like to work alone in some isolated place.                              | 101. | <input type="checkbox"/> | <input type="checkbox"/> |
| 102. I generally keep cool and think clearly in exciting situations.                 | 102. | <input type="checkbox"/> | <input type="checkbox"/> |
| 103. Before I do something I try to consider how my friends will react to it.        | 103. | <input type="checkbox"/> | <input type="checkbox"/> |
| 104. I hesitate to try new foods that I have never tasted before.                    | 104. | <input type="checkbox"/> | <input type="checkbox"/> |
| 105. I am a sound sleeper and have never walked in my sleep.                         | 105. | <input type="checkbox"/> | <input type="checkbox"/> |
| 106. I like to get out and about a lot.  | 106. | <input type="checkbox"/> | <input type="checkbox"/> |
| 107. I like to do work which requires study or thought.                              | 107. | <input type="checkbox"/> | <input type="checkbox"/> |
| 108. There usually seems to be some kind of barrier between me and the opposite sex. | 108. | <input type="checkbox"/> | <input type="checkbox"/> |
| 109. I have often gone against my parents' wishes.                                   | 109. | <input type="checkbox"/> | <input type="checkbox"/> |
| 110. The number of "two faced" individuals I have known is actually very small.      | 110. | <input type="checkbox"/> | <input type="checkbox"/> |
| 111. I sometimes take my work as if it were a matter of life and death.              | 111. | <input type="checkbox"/> | <input type="checkbox"/> |
| 112. I never get attacks of shaking or trembling.                                    | 112. | <input type="checkbox"/> | <input type="checkbox"/> |
| 113. I do not mind losing an argument even when the issue is important.              | 113. | <input type="checkbox"/> | <input type="checkbox"/> |
| 114. It is difficult for me to chat about things in general with people.             | 114. | <input type="checkbox"/> | <input type="checkbox"/> |
| 115. I often feel that I need my friends more than they need me.                     | 115. | <input type="checkbox"/> | <input type="checkbox"/> |
| 116. Too much time is spent in social responsibilities and organizations.            | 116. | <input type="checkbox"/> | <input type="checkbox"/> |
| 117. I have only a few friends with whom I can relax and have a good time.           | 117. | <input type="checkbox"/> | <input type="checkbox"/> |
| 118. I often find neighbourhood conversations boring.                                | 118. | <input type="checkbox"/> | <input type="checkbox"/> |
| 119. I give up easily.   | 119. | <input type="checkbox"/> | <input type="checkbox"/> |
| 120. When a favour is asked of me I often hesitate to commit myself.                 | 120. | <input type="checkbox"/> | <input type="checkbox"/> |
| 121. I prefer to be myself a great deal.   | 121. | <input type="checkbox"/> | <input type="checkbox"/> |
| 122. Sometimes I get so angry that I want to break something.                        | 122. | <input type="checkbox"/> | <input type="checkbox"/> |
| 123. When the odds are against me I still think it is worth taking a chance.         | 123. | <input type="checkbox"/> | <input type="checkbox"/> |
| 124. I love travel and adventure.  | 124. | <input type="checkbox"/> | <input type="checkbox"/> |
| 125. Do you suffer from "nerves"?  | 125. | <input type="checkbox"/> | <input type="checkbox"/> |

(TURN PAGE NOTING YES - NO ANSWER COLUMN REVERSAL)

(NOTE YES - NO ANSWER COLUMN REVERSAL)

NO YES  
(check one)

- |   |      |                          |                          |
|---|------|--------------------------|--------------------------|
| 126. I like to just sit around.   | 126. | <input type="checkbox"/> | <input type="checkbox"/> |
| 127. I prefer to do a thing rather than read about it.                                    | 127. | <input type="checkbox"/> | <input type="checkbox"/> |
| 128. I like to flirt.   | 128. | <input type="checkbox"/> | <input type="checkbox"/> |
| 129. Most people today try to do an honest day's work for a day's pay.                    | 129. | <input type="checkbox"/> | <input type="checkbox"/> |
| 130. I distrust people I have just met until I get better acquainted.                     | 130. | <input type="checkbox"/> | <input type="checkbox"/> |
| 131. I am considered an easy-going person not bothered about having everything "just so". | 131. | <input type="checkbox"/> | <input type="checkbox"/> |
| 132. I can remember "playing sick" to get out of something.                               | 132. | <input type="checkbox"/> | <input type="checkbox"/> |
| 133. In group undertakings I almost always feel that my own plans are best.               | 133. | <input type="checkbox"/> | <input type="checkbox"/> |
| 134. I take an active part in all conversation going on around me.                        | 134. | <input type="checkbox"/> | <input type="checkbox"/> |
| 135. I usually succeed in making a favourable impression on people.                       | 135. | <input type="checkbox"/> | <input type="checkbox"/> |
| 136. I avoid taking on social responsibilities.   | 136. | <input type="checkbox"/> | <input type="checkbox"/> |
| 137. I find little difficulty in addressing a large group.                                | 137. | <input type="checkbox"/> | <input type="checkbox"/> |
| 138. I like to be considered as "one of the group".                                       | 138. | <input type="checkbox"/> | <input type="checkbox"/> |
| 139. When perplexed by a difficult problem I keep trying to solve it.                     | 139. | <input type="checkbox"/> | <input type="checkbox"/> |
| 140. I think that the world will end soon unless we love one another.                     | 140. | <input type="checkbox"/> | <input type="checkbox"/> |
| 141. I do not enjoy entertaining.   | 141. | <input type="checkbox"/> | <input type="checkbox"/> |
| 142. It upsets me very little when things go wrong.                                       | 142. | <input type="checkbox"/> | <input type="checkbox"/> |
| 143. Have you ever made a purchase on impulse?  | 143. | <input type="checkbox"/> | <input type="checkbox"/> |
| 144. I dislike television shows of danger and intrigue.                                   | 144. | <input type="checkbox"/> | <input type="checkbox"/> |
| 145. I can generally face my difficulties.  | 145. | <input type="checkbox"/> | <input type="checkbox"/> |
| 146. I rarely have periods of such great restlessness that I cannot sit long in a chair.  | 146. | <input type="checkbox"/> | <input type="checkbox"/> |
| 147. I seldom analyze the motives of others and compare their reactions with my own.      | 147. | <input type="checkbox"/> | <input type="checkbox"/> |
| 148. Most people think too much about sex.  | 148. | <input type="checkbox"/> | <input type="checkbox"/> |
| 149. I am not overconscientious.  | 149. | <input type="checkbox"/> | <input type="checkbox"/> |
| 150. I have never felt that certain persons were secretly trying to get the better of me. | 150. | <input type="checkbox"/> | <input type="checkbox"/> |

(TURN PAGE NOTING YES - NO ANSWER COLUMN REVERSAL)



(NOTE YES - NO ANSWER COLUMN REVERSAL)		(check one)	
		YES	NO
151. I often like to "dance and throw my cares away".	151.	<input type="checkbox"/>	<input type="checkbox"/>
152. Sometimes quite trivial troubles keep going around in my mind.	152.	<input type="checkbox"/>	<input type="checkbox"/>
153. I am considered to be a submissive person.	153.	<input type="checkbox"/>	<input type="checkbox"/>
154. I am interested in conversation about people whether or not I am acquainted with them.	154.	<input type="checkbox"/>	<input type="checkbox"/>
155. I often feel out of place in company.	155.	<input type="checkbox"/>	<input type="checkbox"/>
156. I generally attend the meetings of school or community organizations.	156.	<input type="checkbox"/>	<input type="checkbox"/>
157. At a social gathering I interact easily with other people.	157.	<input type="checkbox"/>	<input type="checkbox"/>
158. I seldom seek the advice of other people.	158.	<input type="checkbox"/>	<input type="checkbox"/>
159. I am a quick starter but a slow finisher.	159.	<input type="checkbox"/>	<input type="checkbox"/>
160. People have sometimes considered me to be stubborn or obstructive.	160.	<input type="checkbox"/>	<input type="checkbox"/>
161. I am often the life and soul of the party.	161.	<input type="checkbox"/>	<input type="checkbox"/>
162. Sometimes strong emotional moods come over me without apparent cause.	162.	<input type="checkbox"/>	<input type="checkbox"/>
163. I believe in the saying "look before you leap".	163.	<input type="checkbox"/>	<input type="checkbox"/>
164. I prefer sports which have lots of action.	164.	<input type="checkbox"/>	<input type="checkbox"/>
165. I frequently worry about possible misfortunes.	165.	<input type="checkbox"/>	<input type="checkbox"/>
166. I believe that to make the best use of life one should be active.	166.	<input type="checkbox"/>	<input type="checkbox"/>
167. I react to new ideas which I hear or read about by analyzing them to see if they fit in with my point of view.	167.	<input type="checkbox"/>	<input type="checkbox"/>
168. Sex disgusts me.	168.	<input type="checkbox"/>	<input type="checkbox"/>
169. I am greatly concerned over the morals of my generation.	169.	<input type="checkbox"/>	<input type="checkbox"/>
170. I have never felt that a speaker was talking about me personally.	170.	<input type="checkbox"/>	<input type="checkbox"/>
171. I always follow the rule business before pleasure.	171.	<input type="checkbox"/>	<input type="checkbox"/>
172. I sometimes have dizzy spells.	172.	<input type="checkbox"/>	<input type="checkbox"/>
173. I like people to listen hard to what I have to say.	173.	<input type="checkbox"/>	<input type="checkbox"/>
174. I am likely not to speak to people until they speak to me.	174.	<input type="checkbox"/>	<input type="checkbox"/>
175. I am certainly lacking in self-confidence.	175.	<input type="checkbox"/>	<input type="checkbox"/>

(TURN PAGE NOTING YES - NO ANSWER COLUMN REVERSAL)

(NOTE YES - NO ANSWER COLUMN REVERSAL)

(check one)

NO YES

- |   |      |                          |                          |
|---|------|--------------------------|--------------------------|
| 176. I do not like to completely commit myself in planning social outings.                            | 176. | <input type="checkbox"/> | <input type="checkbox"/> |
| 177. I usually feel nervous and am not at ease at a formal dance or party.                            | 177. | <input type="checkbox"/> | <input type="checkbox"/> |
| 178. I often inconvenience myself to oblige others.   | 178. | <input type="checkbox"/> | <input type="checkbox"/> |
| 179. My enthusiasm for a new project does not persist.  | 179. | <input type="checkbox"/> | <input type="checkbox"/> |
| 180. You can spend too much time helping others.  | 180. | <input type="checkbox"/> | <input type="checkbox"/> |
| 181. I am a sociable, outgoing person.  | 181. | <input type="checkbox"/> | <input type="checkbox"/> |
| 182. My mood does not often go up and down.   | 182. | <input type="checkbox"/> | <input type="checkbox"/> |
| 183. I am sometimes slow to make up my mind.  | 183. | <input type="checkbox"/> | <input type="checkbox"/> |
| 184. There is too much excitement in the modern world.  | 184. | <input type="checkbox"/> | <input type="checkbox"/> |
| 185. When difficulties arise I generally keep up hope.  | 185. | <input type="checkbox"/> | <input type="checkbox"/> |
| 186. I seldom have the wanderlust.  | 186. | <input type="checkbox"/> | <input type="checkbox"/> |
| 187. I do not think a great deal.   | 187. | <input type="checkbox"/> | <input type="checkbox"/> |
| 188. When men (or women) get together in a group the topic of conversation usually turns towards sex. | 188. | <input type="checkbox"/> | <input type="checkbox"/> |
| 189. I am rarely troubled about feelings of guilt.  | 189. | <input type="checkbox"/> | <input type="checkbox"/> |
| 190. I have been seriously slighted more than once.   | 190. | <input type="checkbox"/> | <input type="checkbox"/> |
| 191. Do other people regard you as a serious, sober individual?                                       | 191. | <input type="checkbox"/> | <input type="checkbox"/> |
| 192. I seldom worry about my health.  | 192. | <input type="checkbox"/> | <input type="checkbox"/> |
| 193. My opinion seldom sways others.  | 193. | <input type="checkbox"/> | <input type="checkbox"/> |
| 194. When out with other people I prefer to keep quiet.   | 194. | <input type="checkbox"/> | <input type="checkbox"/> |
| 195. At a social event people are usually glad to meet me.  | 195. | <input type="checkbox"/> | <input type="checkbox"/> |
| 196. I easily become involved in straightening out other people's problems.                           | 196. | <input type="checkbox"/> | <input type="checkbox"/> |
| 197. I keep to the people I already know instead of seeking new friends.                              | 197. | <input type="checkbox"/> | <input type="checkbox"/> |
| 198. People say that I often try to sway the group.   | 198. | <input type="checkbox"/> | <input type="checkbox"/> |
| 199. Most problems are solved if you stay at them.  | 199. | <input type="checkbox"/> | <input type="checkbox"/> |
| 200. People who "sound off" should consider the feelings of others.                                   | 200. | <input type="checkbox"/> | <input type="checkbox"/> |

**PLEASE CHECK BACK AND MAKE SURE YOU HAVE ANSWERED EVERY QUESTION**







# COMPREHENSIVE OPINION SURVEY

## FORM B

Full Name: \_\_\_\_\_ Age: \_\_\_\_\_ yr. \_\_\_\_\_ m.  
(Surname) (Given Names)

Institution: \_\_\_\_\_ Sex: ☐ M ☐ F  
(check one)

This booklet contains a series of statements covering a comprehensive range of adult opinions, attitudes and interests. There are 200 statements. Answer each one carefully as it best applies to you. There are no right or wrong answers, each individual answering the survey should express his or her own feelings. It is important to answer ACCURATELY and TRUTHFULLY.

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Prepared by:

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The University of Alberta



		(check one)	
		YES	NO
201. I enjoy being in a crowd just to be with people.	201.	<input type="checkbox"/>	<input type="checkbox"/>
202. My happiness is sometimes so great that I become afraid that it cannot last.	202.	<input type="checkbox"/>	<input type="checkbox"/>
203. I usually say what I feel like saying at the moment.	203.	<input type="checkbox"/>	<input type="checkbox"/>
204. I appreciate quiet amusements rather than exciting ones.	204.	<input type="checkbox"/>	<input type="checkbox"/>
205. Have you often felt listless and tired for no good reason?	205.	<input type="checkbox"/>	<input type="checkbox"/>
206. I can turn out a lot of work in a short time.	206.	<input type="checkbox"/>	<input type="checkbox"/>
207. I would rather do my planning by myself.	207.	<input type="checkbox"/>	<input type="checkbox"/>
208. When a man is with a woman he is usually thinking about things related to her sex.	208.	<input type="checkbox"/>	<input type="checkbox"/>
209. As a child I used to be able to go to my parents with my problems.	209.	<input type="checkbox"/>	<input type="checkbox"/>
210. I can't understand why some people avoid me.	210.	<input type="checkbox"/>	<input type="checkbox"/>
211. I am a happy-go-lucky individual.	211.	<input type="checkbox"/>	<input type="checkbox"/>
212. I often get a feeling of vague restlessness.	212.	<input type="checkbox"/>	<input type="checkbox"/>
213. I speak out in meetings to oppose those whom I feel sure are wrong.	213.	<input type="checkbox"/>	<input type="checkbox"/>
214. I would rather apply for a job by writing a letter than by going for a personal interview.	214.	<input type="checkbox"/>	<input type="checkbox"/>
215. It makes me feel like a failure when I hear of the success of someone I know well.	215.	<input type="checkbox"/>	<input type="checkbox"/>
216. At the scene of an accident I take an active part in helping out.	216.	<input type="checkbox"/>	<input type="checkbox"/>
217. I feel comfortable with people I have never seen before.	217.	<input type="checkbox"/>	<input type="checkbox"/>
218. When I was a child I belonged to a crowd or gang that tried to stick together through thick and thin.	218.	<input type="checkbox"/>	<input type="checkbox"/>
219. I like to work slowly and deliberately.	219.	<input type="checkbox"/>	<input type="checkbox"/>
220. At a restaurant I will do without rather than putting the staff to extra trouble.	220.	<input type="checkbox"/>	<input type="checkbox"/>
221. I prefer to stay at home rather than attend social affairs.	221.	<input type="checkbox"/>	<input type="checkbox"/>
222. I am always calm and collected.	222.	<input type="checkbox"/>	<input type="checkbox"/>
223. I seldom make decisions on the spur of the moment.	223.	<input type="checkbox"/>	<input type="checkbox"/>
224. I dislike excitement.	224.	<input type="checkbox"/>	<input type="checkbox"/>
225. I rarely find it difficult to go to sleep at night through thinking of the days happenings.	225.	<input type="checkbox"/>	<input type="checkbox"/>

(TURN PAGE NOTING YES - NO ANSWER COLUMN REVERSAL)

## (NOTE YES - NO ANSWER COLUMN REVERSAL)

(check one)

NO YES

226. I often set a pace which others find hard to keep up with.	226.	<input type="checkbox"/>	<input type="checkbox"/>
227. I feel "stale" if I am kept indoors too long.	227.	<input type="checkbox"/>	<input type="checkbox"/>
228. I am embarrassed by dirty stories.	228.	<input type="checkbox"/>	<input type="checkbox"/>
229. There are far too many useless laws which hamper an individual's personal freedom.	229.	<input type="checkbox"/>	<input type="checkbox"/>
230. I know of no one who would wish me harm.	230.	<input type="checkbox"/>	<input type="checkbox"/>
231. I take life very seriously.	231.	<input type="checkbox"/>	<input type="checkbox"/>
232. Wild animals at a zoo make me feel nervous, even though they are in cages.	232.	<input type="checkbox"/>	<input type="checkbox"/>
233. I avoid arguing over a price with a clerk or salesman.	233.	<input type="checkbox"/>	<input type="checkbox"/>
234. I find it difficult to carry on a light conversation with strangers.	234.	<input type="checkbox"/>	<input type="checkbox"/>
235. I usually realize my personal expectations.	235.	<input type="checkbox"/>	<input type="checkbox"/>
236. The best way to handle people is to tell them what they want to hear.	236.	<input type="checkbox"/>	<input type="checkbox"/>
237. I am not considered a shy person.	237.	<input type="checkbox"/>	<input type="checkbox"/>
238. I do not resent it if others take advantage of my friendliness.	238.	<input type="checkbox"/>	<input type="checkbox"/>
239. I like changing from one kind of a task to another frequently during the day.	239.	<input type="checkbox"/>	<input type="checkbox"/>
240. Good relations with others are secondary to free personal expression.	240.	<input type="checkbox"/>	<input type="checkbox"/>
241. I like to mix socially with people.	241.	<input type="checkbox"/>	<input type="checkbox"/>
242. I sometimes feel happy and sometimes depressed without any apparent reason.	242.	<input type="checkbox"/>	<input type="checkbox"/>
243. I rarely get into a jam because I do things without considering the consequences.	243.	<input type="checkbox"/>	<input type="checkbox"/>
244. I enjoy many different types of play and recreation.	244.	<input type="checkbox"/>	<input type="checkbox"/>
245. Do you ever get short of breath without having done any heavy work?	245.	<input type="checkbox"/>	<input type="checkbox"/>
246. I have sometimes been asked to "speed up" on a job.	246.	<input type="checkbox"/>	<input type="checkbox"/>
247. Are you frequently "lost in thought" even when supposed to be taking part in a conversation?	247.	<input type="checkbox"/>	<input type="checkbox"/>
248. I like love scenes in a movie or play.	248.	<input type="checkbox"/>	<input type="checkbox"/>
249. I would rather not have responsibility for other people.	249.	<input type="checkbox"/>	<input type="checkbox"/>
250. There are times when it seems everyone is against you.	250.	<input type="checkbox"/>	<input type="checkbox"/>

(TURN PAGE NOTING YES - NO ANSWER COLUMN REVERSAL)



(NOTE YES - NO ANSWER COLUMN REVERSAL)

(check one)

YES NO

- |   |      |                          |                          |
|---|------|--------------------------|--------------------------|
| 251. It is difficult for me to understand people who get very concerned about things.             | 251. | <input type="checkbox"/> | <input type="checkbox"/> |
| 252. I almost always feel well and strong.  | 252. | <input type="checkbox"/> | <input type="checkbox"/> |
| 253. When I work on a committee I like to take charge of things.                                  | 253. | <input type="checkbox"/> | <input type="checkbox"/> |
| 254. I find it easy to start conversation with strangers.   | 254. | <input type="checkbox"/> | <input type="checkbox"/> |
| 255. I am most often successful in dealing with people.   | 255. | <input type="checkbox"/> | <input type="checkbox"/> |
| 256. I do not worry about having made a faux pas (i.e., a social error).                          | 256. | <input type="checkbox"/> | <input type="checkbox"/> |
| 257. I prefer to visit with one person rather than with a group of people.                        | 257. | <input type="checkbox"/> | <input type="checkbox"/> |
| 258. I am quite often not in on the gossip and talk of the group I belong to.                     | 258. | <input type="checkbox"/> | <input type="checkbox"/> |
| 259. I enjoy discarding the old and accepting the new.  | 259. | <input type="checkbox"/> | <input type="checkbox"/> |
| 260. In discussing touchy subjects I never forget politeness.                                     | 260. | <input type="checkbox"/> | <input type="checkbox"/> |
| 261. I generally keep in the background on social occasions.                                      | 261. | <input type="checkbox"/> | <input type="checkbox"/> |
| 262. I quickly calm down after losing my temper.  | 262. | <input type="checkbox"/> | <input type="checkbox"/> |
| 263. On the whole I am rather an impulsive person.  | 263. | <input type="checkbox"/> | <input type="checkbox"/> |
| 264. When I get bored I like to stir up some excitement.  | 264. | <input type="checkbox"/> | <input type="checkbox"/> |
| 265. I can discuss most subjects without getting touchy.  | 265. | <input type="checkbox"/> | <input type="checkbox"/> |
| 266. I am not energetic and find it difficult to keep busy.                                       | 266. | <input type="checkbox"/> | <input type="checkbox"/> |
| 267. The thinking which I do is largely limited to that which I must do in the course of my work. | 267. | <input type="checkbox"/> | <input type="checkbox"/> |
| 268. Have you often avoided members of the opposite sex?  | 268. | <input type="checkbox"/> | <input type="checkbox"/> |
| 269. Most public office holders generally put public interests ahead of their own.                | 269. | <input type="checkbox"/> | <input type="checkbox"/> |
| 270. I often wonder what hidden reason another person may have for doing something nice for me.   | 270. | <input type="checkbox"/> | <input type="checkbox"/> |
| 271. I am so concerned about the future that I don't get as much out of the present as I might.   | 271. | <input type="checkbox"/> | <input type="checkbox"/> |
| 272. I do not have spells of hay fever or asthma.   | 272. | <input type="checkbox"/> | <input type="checkbox"/> |
| 273. I am easily downed in an argument.   | 273. | <input type="checkbox"/> | <input type="checkbox"/> |
| 274. I do less than my share of talking in a conversation.  | 274. | <input type="checkbox"/> | <input type="checkbox"/> |
| 275. In a group of people, new acquaintances or strangers pay little attention to me.             | 275. | <input type="checkbox"/> | <input type="checkbox"/> |

(TURN PAGE NOTING YES - NO ANSWER COLUMN REVERSAL)

## (NOTE YES - NO ANSWER COLUMN REVERSAL)

(check one)

NO YES

276. I would be agreeable to work on a charity drive.	276.	<input type="checkbox"/>	<input type="checkbox"/>
277. I readily come forward on social occasions.	277.	<input type="checkbox"/>	<input type="checkbox"/>
278. I could be happy working in a store at a complaints counter.	278.	<input type="checkbox"/>	<input type="checkbox"/>
279. I have no difficulty in finishing a task.	279.	<input type="checkbox"/>	<input type="checkbox"/>
280. Good manners are not that important.	280.	<input type="checkbox"/>	<input type="checkbox"/>
281. I spend my vacation at a lively resort rather than a quiet place.	281.	<input type="checkbox"/>	<input type="checkbox"/>
282. I have periods when I feel unusually cheerful without any special reason.	282.	<input type="checkbox"/>	<input type="checkbox"/>
283. I prefer action to planning for action.	283.	<input type="checkbox"/>	<input type="checkbox"/>
284. I find little attraction toward the clashing colours and irregular forms of modern art.	284.	<input type="checkbox"/>	<input type="checkbox"/>
285. Would you rate yourself as a tense or "highly strung" individual?	285.	<input type="checkbox"/>	<input type="checkbox"/>
286. I often find myself with nothing to do.	286.	<input type="checkbox"/>	<input type="checkbox"/>
287. I do not keep a personal diary.	287.	<input type="checkbox"/>	<input type="checkbox"/>
288. I never attend a sexy show if I can avoid it.	288.	<input type="checkbox"/>	<input type="checkbox"/>
289. Most people fulfill their duties even when not being watched.	289.	<input type="checkbox"/>	<input type="checkbox"/>
290. I get very tense and anxious when I think other people are disapproving of me.	290.	<input type="checkbox"/>	<input type="checkbox"/>
291. I believe that sobriety is preferable to carefree frivolousness.	291.	<input type="checkbox"/>	<input type="checkbox"/>
292. I have days in which it seems that everything goes wrong.	292.	<input type="checkbox"/>	<input type="checkbox"/>
293. I like to "take command" by knowing what is best for my group.	293.	<input type="checkbox"/>	<input type="checkbox"/>
294. I talk with strangers when I travel.	294.	<input type="checkbox"/>	<input type="checkbox"/>
295. I have several times given up doing a thing because I thought too little of my ability.	295.	<input type="checkbox"/>	<input type="checkbox"/>
296. My own ideas come second to getting along smoothly with people.	296.	<input type="checkbox"/>	<input type="checkbox"/>
297. I try to avoid contacts with new people.	297.	<input type="checkbox"/>	<input type="checkbox"/>
298. I usually go along with what the gang wants to do.	298.	<input type="checkbox"/>	<input type="checkbox"/>
299. At times I have worn myself out by undertaking too much.	299.	<input type="checkbox"/>	<input type="checkbox"/>
300. Most people do not respect the rights of others.	300.	<input type="checkbox"/>	<input type="checkbox"/>

(TURN PAGE NOTING YES - NO ANSWER COLUMN REVERSAL)



(NOTE YES - NO ANSWER COLUMN REVERSAL)

(check one)

YES NO

- |  |      |                          |                          |
|--|------|--------------------------|--------------------------|
| 301. Most people have more friends than I have.  | 301. | <input type="checkbox"/> | <input type="checkbox"/> |
| 302. I get over a humiliating experience very quickly.                                     | 302. | <input type="checkbox"/> | <input type="checkbox"/> |
| 303. I seldom plan things carefully well ahead of time.                                    | 303. | <input type="checkbox"/> | <input type="checkbox"/> |
| 304. I like plenty of bustle and excitement around me.                                     | 304. | <input type="checkbox"/> | <input type="checkbox"/> |
| 305. I wish I could be as happy as others seem to be.                                      | 305. | <input type="checkbox"/> | <input type="checkbox"/> |
| 306. I am regarded as a very energetic person.   | 306. | <input type="checkbox"/> | <input type="checkbox"/> |
| 307. I enjoy thinking out complicated problems.  | 307. | <input type="checkbox"/> | <input type="checkbox"/> |
| 308. I like to talk about sex.   | 308. | <input type="checkbox"/> | <input type="checkbox"/> |
| 309. I seldom worry about things I should not have said or done.                           | 309. | <input type="checkbox"/> | <input type="checkbox"/> |
| 310. Other people too often take the credit for things you yourself have done.             | 310. | <input type="checkbox"/> | <input type="checkbox"/> |
| 311. I generally feel as though I haven't a care in the world.                             | 311. | <input type="checkbox"/> | <input type="checkbox"/> |
| 312. I rarely get palpitation or thumping in my heart.                                     | 312. | <input type="checkbox"/> | <input type="checkbox"/> |
| 313. I am unlikely to talk back to a policeman or other person in authority.               | 313. | <input type="checkbox"/> | <input type="checkbox"/> |
| 314. I am considered an amusing talker.  | 314. | <input type="checkbox"/> | <input type="checkbox"/> |
| 315. I feel that I am not a successful person.   | 315. | <input type="checkbox"/> | <input type="checkbox"/> |
| 316. I don't believe in showing up my neighbour even if he cheats me over small matters.   | 316. | <input type="checkbox"/> | <input type="checkbox"/> |
| 317. Socially I am not considered reticent and retiring.                                   | 317. | <input type="checkbox"/> | <input type="checkbox"/> |
| 318. I often become bored when the topic of conversation is unrelated to my own interests. | 318. | <input type="checkbox"/> | <input type="checkbox"/> |
| 319. If a problem is difficult I find it best to drop it.                                  | 319. | <input type="checkbox"/> | <input type="checkbox"/> |
| 320. I am insensitive to the needs and wishes of others.                                   | 320. | <input type="checkbox"/> | <input type="checkbox"/> |
| 321. I enjoy parties where there are lots of people.                                       | 321. | <input type="checkbox"/> | <input type="checkbox"/> |
| 322. I am frequently over annoyed by quite small setbacks.                                 | 322. | <input type="checkbox"/> | <input type="checkbox"/> |
| 323. My advice to people is "go ahead and try it, it won't hurt".                          | 323. | <input type="checkbox"/> | <input type="checkbox"/> |
| 324. I sometimes like to drive very fast because I find it exciting.                       | 324. | <input type="checkbox"/> | <input type="checkbox"/> |
| 325. I seldom suffer from sleeplessness.   | 325. | <input type="checkbox"/> | <input type="checkbox"/> |

(TURN PAGE NOTING YES - NO ANSWER COLUMN REVERSAL)

(NOTE YES - NO ANSWER COLUMN REVERSAL)

(check one)

NO YES

326. I am usually too busy to spend time in reflective thoughts.	326.	<input type="checkbox"/>	<input type="checkbox"/>
327. I frequently introspect, that is, turn my attention inward toward myself.	327.	<input type="checkbox"/>	<input type="checkbox"/>
328. It is alright to read sexually suggestive literature.	328.	<input type="checkbox"/>	<input type="checkbox"/>
329. Far too many people try to take as much as they can, and give as little as possible back to society.	329.	<input type="checkbox"/>	<input type="checkbox"/>
330. I have never been blamed without cause.	330.	<input type="checkbox"/>	<input type="checkbox"/>
331. I am inclined to take my work casually, that is as a matter of course.	331.	<input type="checkbox"/>	<input type="checkbox"/>
332. I sometimes get very bad headaches.	332.	<input type="checkbox"/>	<input type="checkbox"/>
333. People have told me I am aggressive.	333.	<input type="checkbox"/>	<input type="checkbox"/>
334. It is easy for me to talk with people.	334.	<input type="checkbox"/>	<input type="checkbox"/>
335. I rarely blush.	335.	<input type="checkbox"/>	<input type="checkbox"/>
336. Discussion of local problems does not interest me.	336.	<input type="checkbox"/>	<input type="checkbox"/>
337. I have difficulty in making new friends.	337.	<input type="checkbox"/>	<input type="checkbox"/>
338. When in a group I am usually wrapped up in my own thoughts.	338.	<input type="checkbox"/>	<input type="checkbox"/>
339. I believe that "if at first you don't succeed, try, try again."	339.	<input type="checkbox"/>	<input type="checkbox"/>
340. If I can, I give a helping hand whenever needed.	340.	<input type="checkbox"/>	<input type="checkbox"/>
341. I would not mind at all being prevented from making numerous social contacts.	341.	<input type="checkbox"/>	<input type="checkbox"/>
342. I rarely have feelings of uselessness.	342.	<input type="checkbox"/>	<input type="checkbox"/>
343. Do people say you sometimes behave rashly?	343.	<input type="checkbox"/>	<input type="checkbox"/>
344. I dislike being stirred up by an event.	344.	<input type="checkbox"/>	<input type="checkbox"/>
345. You feel lonesome even when you are with other people.	345.	<input type="checkbox"/>	<input type="checkbox"/>
346. I sometimes lack energy when I need it.	346.	<input type="checkbox"/>	<input type="checkbox"/>
347. After a lecture or a class I rarely think about the ideas presented.	347.	<input type="checkbox"/>	<input type="checkbox"/>
348. I wish I were not bothered by thoughts about sex.	348.	<input type="checkbox"/>	<input type="checkbox"/>
349. I like worldliness in people.	349.	<input type="checkbox"/>	<input type="checkbox"/>
350. No one has ever deliberately made things hard for me.	350.	<input type="checkbox"/>	<input type="checkbox"/>

(TURN PAGE NOTING YES - NO ANSWER COLUMN REVERSAL)

## (NOTE YES - NO ANSWER COLUMN REVERSAL)

(check one)

YES NO

- |   |      |                          |                          |
|---|------|--------------------------|--------------------------|
| 351. I believe that distant goals are more important than immediate gratification.                                | 351. | <input type="checkbox"/> | <input type="checkbox"/> |
| 352. I am rarely troubled by aches and pains.   | 352. | <input type="checkbox"/> | <input type="checkbox"/> |
| 353. I seldom fight for what I believe is right.  | 353. | <input type="checkbox"/> | <input type="checkbox"/> |
| 354. While in trains, buses, etc., I often talk to strangers.   | 354. | <input type="checkbox"/> | <input type="checkbox"/> |
| 355. I can readily express my opinions.   | 355. | <input type="checkbox"/> | <input type="checkbox"/> |
| 356. I am chiefly concerned with my own affairs.  | 356. | <input type="checkbox"/> | <input type="checkbox"/> |
| 357. I am embarrassed when I arrive too early or too late at a social affair.                                     | 357. | <input type="checkbox"/> | <input type="checkbox"/> |
| 358. In a discussion I often find it necessary to repeat myself several times to make sure I am being understood. | 358. | <input type="checkbox"/> | <input type="checkbox"/> |
| 359. It is hard for me to work intensely on a scholarly problem for more than an hour or two at a stretch.        | 359. | <input type="checkbox"/> | <input type="checkbox"/> |
| 360. I am not considered a diplomatic person.   | 360. | <input type="checkbox"/> | <input type="checkbox"/> |
| 361. Can you easily get some life into a rather dull party?   | 361. | <input type="checkbox"/> | <input type="checkbox"/> |
| 362. I feel that no one is very much the same person two days in succession.                                      | 362. | <input type="checkbox"/> | <input type="checkbox"/> |
| 363. I rarely act without careful consideration.  | 363. | <input type="checkbox"/> | <input type="checkbox"/> |
| 364. I am invigorated by a brisk, cold day.   | 364. | <input type="checkbox"/> | <input type="checkbox"/> |
| 365. I do not let small matters disturb me.   | 365. | <input type="checkbox"/> | <input type="checkbox"/> |
| 366. I like to be active.   | 366. | <input type="checkbox"/> | <input type="checkbox"/> |
| 367. I have frequently found myself, when alone, pondering such abstract problems as free will, evil, etc.        | 367. | <input type="checkbox"/> | <input type="checkbox"/> |
| 368. I approve of contemporary sexual morality.   | 368. | <input type="checkbox"/> | <input type="checkbox"/> |
| 369. I generally prefer to associate with polite rather than rough rebellious persons.                            | 369. | <input type="checkbox"/> | <input type="checkbox"/> |
| 370. I never question the honesty of people.  | 370. | <input type="checkbox"/> | <input type="checkbox"/> |
| 371. I like to throw aside restraints and 'be myself'.  | 371. | <input type="checkbox"/> | <input type="checkbox"/> |
| 372. Overwork gives me indigestion or constipation.   | 372. | <input type="checkbox"/> | <input type="checkbox"/> |
| 373. I seldom throw my weight around.   | 373. | <input type="checkbox"/> | <input type="checkbox"/> |
| 374. In a group of people I find myself at a loss for words.  | 374. | <input type="checkbox"/> | <input type="checkbox"/> |
| 375. I am not troubled about being self-conscious.  | 375. | <input type="checkbox"/> | <input type="checkbox"/> |

(TURN PAGE NOTING YES - NO ANSWER COLUMN REVERSAL)

(NOTE YES - NO ANSWER COLUMN REVERSAL)

(check one)

NO YES

- |   |      |                          |                          |
|---|------|--------------------------|--------------------------|
| 376. I am sensitive to certain unwritten social rules.  | 376. | <input type="checkbox"/> | <input type="checkbox"/> |
| 377. Are you often self-conscious in front of strangers?  | 377. | <input type="checkbox"/> | <input type="checkbox"/> |
| 378. I like people around me.   | 378. | <input type="checkbox"/> | <input type="checkbox"/> |
| 379. People do not consider me to be a quitter.   | 379. | <input type="checkbox"/> | <input type="checkbox"/> |
| 380. Politeness makes things easier for everyone.   | 380. | <input type="checkbox"/> | <input type="checkbox"/> |
| 381. I prefer to stay home with a hobby rather than attend a lively party.                                | 381. | <input type="checkbox"/> | <input type="checkbox"/> |
| 382. I most often feel in the right mood to see anyone.   | 382. | <input type="checkbox"/> | <input type="checkbox"/> |
| 383. I am not a decisive person.  | 383. | <input type="checkbox"/> | <input type="checkbox"/> |
| 384. I would prefer friends who are not excitingly unpredictable.   | 384. | <input type="checkbox"/> | <input type="checkbox"/> |
| 385. I am not upset by discouraging events.   | 385. | <input type="checkbox"/> | <input type="checkbox"/> |
| 386. I can sit still for a long time without feeling fidgety.   | 386. | <input type="checkbox"/> | <input type="checkbox"/> |
| 387. I do not like to have time to be alone with my thoughts.   | 387. | <input type="checkbox"/> | <input type="checkbox"/> |
| 388. I do not believe that a successful marriage is based on sex.   | 388. | <input type="checkbox"/> | <input type="checkbox"/> |
| 389. I think I am more easy going about right and wrong than most people.                                 | 389. | <input type="checkbox"/> | <input type="checkbox"/> |
| 390. There have been times when you have been bothered by the idea that someone is reading your thoughts. | 390. | <input type="checkbox"/> | <input type="checkbox"/> |
| 391. Doing what one likes is not the most important thing in life.  | 391. | <input type="checkbox"/> | <input type="checkbox"/> |
| 392. I seldom have cause to alter my plans for reasons of health.   | 392. | <input type="checkbox"/> | <input type="checkbox"/> |
| 393. I am usually right on important matters.   | 393. | <input type="checkbox"/> | <input type="checkbox"/> |
| 394. I am a better listener than a conversationalist.   | 394. | <input type="checkbox"/> | <input type="checkbox"/> |
| 395. I sometimes feel socially inferior.  | 395. | <input type="checkbox"/> | <input type="checkbox"/> |
| 396. I am not active on committees.   | 396. | <input type="checkbox"/> | <input type="checkbox"/> |
| 397. No one has ever considered me to be a "wallflower".  | 397. | <input type="checkbox"/> | <input type="checkbox"/> |
| 398. I am concerned if a good remark of mine is ignored by the group.                                     | 398. | <input type="checkbox"/> | <input type="checkbox"/> |
| 399. I prefer a job in which there is change and variety.   | 399. | <input type="checkbox"/> | <input type="checkbox"/> |
| 400. I do not feel that I am my "brother's keeper".   | 400. | <input type="checkbox"/> | <input type="checkbox"/> |

**PLEASE CHECK BACK AND MAKE SURE YOU HAVE ANSWERED EVERY QUESTION**

















**B30003**